

FRUIT INTAKE AMONG ACTIVE DUTY AIR FORCE MALE ENLISTEES AT  
THE WORKSITE: THE DEVELOPMENT OF AN INSTRUMENT TO  
MEASURE FACTORS ASSOCIATED WITH CONSUMPTION OR AVOIDANCE

Maureen Oliver Harback

**DISTRIBUTION STATEMENT B**  
Distribution authorized to  
U. S. Govt. Agencies Only  
Other requests shall be referred to:

---


Bachelor of Science  
Auburn University, 1990


Master of Science  
University of LaVerne, 1998

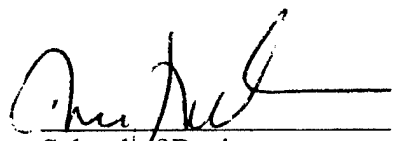
-----

Submitted in Partial Fulfillment of the  
Requirements for the Degree of Master of Science in the  
Department of Health Promotion and Education  
School of Public Health  
University of South Carolina

2000

  
Department of Health Promotion and Education  
Director of Thesis

  
Department of Health Promotion and Education  
2<sup>nd</sup> Reader

  
School of Business  
Department of Marketing  
3<sup>rd</sup> Reader

\_\_\_\_\_  
Dean of the Graduate School

20000307 054

REPORT DOCUMENTATION PAGE			Form Approved OMB No. 0704-0188	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.				
1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE 17.Feb.00	3. REPORT TYPE AND DATES COVERED THESIS	
4. TITLE AND SUBTITLE FRUIT INTAKE AMONG ACTIVE DUTY AIR FORCE MALE ENLISTEES AT THE WORKSITE: THE DEVELOPMENT OF AN INSTRUMENT TO MEASURE FACTORS ASSOCIATED WITH CONSUMPTION OR AVOIDANCE			5. FUNDING NUMBERS	
6. AUTHOR(S) CAPT HARBACK MAUREEN O				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) UNIVERSITY OF SOUTH CAROLINA			8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) THE DEPARTMENT OF THE AIR FORCE AFIT/CIA, BLDG 125 2950 P STREET WPAFB OH 45433			10. SPONSORING/MONITORING AGENCY REPORT NUMBER  FY00-72	
11. SUPPLEMENTARY NOTES				
12a. DISTRIBUTION AVAILABILITY STATEMENT Unlimited distribution In Accordance With AFI 35-205/AFIT Sup 1			12b. DISTRIBUTION CODE	
13. ABSTRACT (Maximum 200 words)				
14. SUBJECT TERMS			15. NUMBER OF PAGES 119	
			16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT	

## Table of Contents

	page
Chapter I. Introduction	
Importance of fruit and vegetable consumption	1
The 5-A-Day for better health program	3
Current trends in fruit and vegetable consumption	4
Importance of dietary habits in young adults	6
Nutrition education/intervention	6
Purpose and significance of the study	9
Chapter II. Literature Review	
Value-expectancy theories	11
Health belief model	12
Theory of Reasoned Action	14
Theory of Planned Behavior	15
Influences on nutrition behavior	20
Attitudes and beliefs	20
Social environment	26
Perceived behavioral control	29
Motivational control factors	30
Tangible control factors	32
Limitations of the Theory of Planned Behavior	35
Specificity versus practicality	36
Competing food choices	36
Research objectives	39
Chapter III. Methods	
Research design	41
Step 1. Behavior defined	41
Step 2. Intention defined	42
Step 3. Elicitation of salient beliefs	43
Instrument development	43
Pilot test	44
Final elicitation questionnaire	45
Subjects	46

Data analysis	47
Normative beliefs	47
Behavioral and control beliefs	48
Fruits versus other foods	49
Fruit versus other fruits	50
Step 4. Conduct final questionnaire	51
Questionnaire development	51
Measurement of attitude	51
Measurement of subjective norm	52
Measurement of perceived behavioral control	52
Measurement of intention	53
Measurement of patterns of eating behavior	53
Measurement of utility of fruit	54
Measurement of demographic data	55
Organization and layout	55
Pilot test	55
Expert panel	56
Target population	58
 Chapter IV. Results	
Description of subjects	61
Modal salient beliefs	62
Normative beliefs	62
Behavioral and control beliefs	64
Behavioral beliefs for the general behavioral target	64
Control beliefs for the general behavioral target	66
Behavioral beliefs for the general behavioral target	68
Control beliefs for the general behavioral target	69
Comparison of modal salient beliefs	71
Behavioral beliefs	71
Control beliefs	72
Final questionnaire	73
 Chapter V. Discussion	
Elicitation process	74
Elicitation questionnaire design	74
Elicitation questionnaire analysis	76
Elicitation questionnaire results	77
Modal salient beliefs	77
Normative beliefs	77
Behavioral and control beliefs	78
Final questionnaire	82

Final questionnaire design	82
Proposed final questionnaire administration	83
Study implications	84
Study limitations	85
 Appendix A	 86
 References	 114

## List of Tables

	page
Table 1 Results of elicitation questionnaire – normative beliefs	63
Table 2 Results of elicitation questionnaire – behavioral beliefs for general behavioral category	64
Table 3 Results of elicitation questionnaire – control beliefs for general behavioral category	67
Table 4 Results of elicitation questionnaire – behavioral beliefs for specific behavioral targets	68
Table 5 Results of elicitation questionnaire – control beliefs for specific behaviors	70

## List of Figures

	page
Figure 1 Theory of Reasoned Action	14
Figure 2 Theory of Planned Behavior	16
Figure 3 Four-way analysis of elicitation questionnaire responses	48

## CHAPTER I

### INTRODUCTION

#### Importance of Fruit and Vegetable Consumption

Over the past several decades, researchers have reached a consensus on the relationship between diet and chronic diseases (National Research Council, 1989; US Department of Health and Human Services, 1988, 1990). An area of particular interest and investigation within the past several years is the association between fruit and vegetable consumption and disease. Increasing evidence suggests a strong link between levels of fruit and vegetable intake and health status (National Research Council, 1989). Specifically, fruit and vegetable consumption is cited as a protective element against some of the leading causes of morbidity and mortality in the United States such as cancer, heart disease, and stroke (Steinmetz & Potter, 1996; Gillman et al., 1995).

Research focusing on the beneficial effects of fruit and vegetable consumption on cancer prevention is the most prevalent. Although several dietary risk factors for specific cancers have been hypothesized, the theory most supported in the literature is the protective effect of high fruit and vegetable consumption against cancer of a variety of anatomical sites. In a review of 206 human epidemiologic studies and 22 animal studies, evidence for greater fruit and vegetable consumption is consistent for cancers of the stomach, esophagus, lung, oral cavity and larynx, endometrium, pancreas, and colon. In



the same review, researchers found many of the cohort and case-control studies show that people who consume a high level (about five servings per day) of fruits and vegetables were half as likely to develop cancer as those who consumed a low level (fewer than two servings per day) (Steinmetz & Potter, 1996).

Evidence is also available to support the association of fruit and vegetable consumption to the risk of coronary heart disease (CHD). Specific features of this food group are associated with reduction in CHD risk factors. For example, fiber in fruits and vegetables may help to control diabetes and high serum cholesterol levels, potassium may contribute to the control or prevention of hypertension, and relatively low fat and calorie content may reduce risk of obesity (Steinmetz & Potter, 1996). Preliminary research included an ecological study that related higher consumption of fruits and vegetables with a decrease in mortality from all cardiovascular diseases (Verlangieri, Kapeghian, el-Dean & Bush, 1985). In a more recent prospective study on male health professionals without CHD or diabetes, researchers found vegetable, fruit, and cereal fiber intake, independent of fat intake, is an important dietary component for the prevention of heart disease (Rimm, et al., 1996). Additional prospective studies investigate this association by focusing on the fiber-contributing quality of fruits and vegetables and support the inverse relationship between fiber and CHD (Humble, 1993; Khaw, 1987).

Cerebrovascular disease, another leading cause of death in the United States, is linked to fruit and vegetable consumption. Although early studies on the association between diet and stroke incidence were limited and focused on particular nutrients, more recent studies are focusing on particular foods. In a preliminary ecological study on the association between fruit and vegetable consumption and stroke, researchers found an inverse relationship (Achenson & Williams, 1983). In a more recent cohort study,

investigators examined the effect of fruit and vegetable intake on the risk of stroke among middle-aged men over 20 years of follow-up. After adjusting for other stroke related risk factors, an increase in fruit and vegetable consumption was associated with a significant decrease in stroke incidence (Gillman et al. 1995).

In addition to the evidence supporting the protective role of fruits and vegetables in the incidence of cancer, heart disease and stroke, data suggests a similar effect on other prevalent chronic diseases in this country. As mentioned previously, fruit and vegetable consumption is also linked to diverticulitis prevention, diabetes control, cholesterol control, hypertension control and prevention, and reduction in risk of obesity (Steinman, 1996; Gillman et al., 1995). This data suggests that an increase in the consumption of fruits and vegetables among Americans will have significant and widespread benefits.

### The 5-A-Day For Better Health Program

The 5 a Day for Better Health program is a public health effort to increase the consumption of fruits and vegetables and reach the dietary objective for the year 2000 of five or more daily servings (US Department of Health and Human Services, 1990). This program began as an initiative of the California State Department of Health Services and was funded by the National Cancer Institute (Heimendinger, 1993). It became a national program in 1991 and is the first national nutrition program to approach Americans with a simple, positive dietary message. The program is jointly sponsored by NCI and the Produce for Better Health Foundation, a nonprofit consumer education organization that represents the fruit and vegetable industry, which makes it the largest public-private partnership in the United States committed to health promotion (Heimendinger & Van Duyn, 1995).

In their article on the challenge of changing the role of fruit and vegetables in the American diet, Heimendinger and Van Duyn (1995) use the 5 a Day program as an example of the importance of moving beyond epidemiologic and sociodemographic data to plan effective programs. According to the authors, effective program planning involves the use of data from studies on dietary behavior and strategies for assisting populations to make the proposed changes. The 5 a Day program has applied behavior change theories such as social marketing, the health belief model, stages of change theory, diffusion theory and social learning theory. Although these models have been used in the planning, implementation, and evaluation phases of the program for specific target populations, additional investigation of determinants of fruit and vegetable consumption in a wider range of populations at risk will expand the program effectiveness among more Americans.

### Current Trends in Fruit and Vegetable Consumption

A baseline study of American's fruit and vegetable consumption conducted by Subar, et al. (1991) measured knowledge, awareness, and behavior. At that point, only 8% of American adults thought they should eat five or more servings of fruits and vegetables daily, while 66% thought two or fewer servings were sufficient. With regard to behavior, the average American consumed 3.5 servings of fruits and vegetables. Twenty-three percent met the goal of five or more servings daily.

According to the same study (Subar, et al., 1991), consumption awareness and behavior among some demographic groups is even lower, particularly among men and younger adults. Twenty-five percent of women thought they should have five or more servings per day, compared to 10% of men. Furthermore, the results indicate behavior is

consistent with awareness. The survey found that although men consume more food than women, they eat fewer servings of fruits and vegetables. Median intake for men was three servings daily, compared to four servings daily for women. In another study on the psychosocial factors influencing low fruit and vegetable consumption, Laforge et al. (1994) found adult males were twice as likely as females to eat two or fewer servings a day. With respect to age, the baseline study (Subar, et al., 1991) found younger (18-34 years) adults eat an average of three servings per day, versus an average of four servings per day among older adults (65 years and older).

However, a more recent study showed conflicting results (Keim, Stewart, & Voichick, 1997). This cross-sectional study examined vegetable and fruit intake and perceptions of selected young adults (18-24 years). Using a food frequency questionnaire, researchers found median intake at 3.7 servings per day. In contrast to 5 A Day baseline data, men consumed more servings (4.3 per day) than women (3.3 per day). Although the authors acknowledged the tendency of food frequency questionnaires to overestimate intakes, the observed reversal in trend among males and females is notable. An additional finding of interest in this study is the discrepancy in intake between students and non-students. Male non-student intake was 4.0 servings per day and male student intake was 4.5 servings per day. Although the consumption trends among this population are not consistent with the deficits found in the national baseline study, average intakes still fail to meet the goal of five daily servings.

In summary, although studies in specific population groups are limited and trends among available studies are inconsistent, there is evidence to support that the median fruit and vegetable consumption among Americans falls short of the recommended levels. Specifically, differences in knowledge, awareness, and behavior among specific

demographic groups, such as young adults and men, indicate population-specific intervention is necessary to reach the dietary goals.

### Importance of Dietary Habits in Young Adulthood

Although limited research has been done on this age group, some evidence exists that lifestyle and quality of diet in young adulthood may have long-term health implications. In a study of 15-24 year olds in Finland, Raitakari et.al. (1994), reported that smoking, obesity, butter consumption, and inactivity were adverse habits or conditions associated with atherogenic lipid profiles and high blood pressure even at this young age. A more recent review article also summarized findings on the relationship between nutrition in early life and cardiovascular disease (McGill, 1998). Findings from the 32 articles reviewed on this relationship support the theory that making dietary changes sufficient to lower plasma cholesterol levels early in life would retard the progression of atherosclerosis. Both of these studies support the generally accepted principle that dietary habits established and practiced by the age of 30 will have long term implications on adult health.

### Nutrition Education/Intervention

In a review article on the effectiveness of nutrition education programs, Contento, I., et al. (1995) defined nutrition education as “any set of learning experiences designed to facilitate the voluntary adoption of eating and other nutrition-related behaviors conducive to health and well-being” (pg 279). Given that eating and most other nutrition-related behaviors are volitional behaviors, it is essential to incorporate an understanding of the motivation for these behaviors into the planning of these “learning

experiences.” In their comprehensive review of 217 nutrition education intervention studies spanning the past 15 years, Contento, I., et al. (1995) found overwhelming evidence to support behaviorally-focused nutrition education efforts that were based on theory and prior research. Interventions in all population groups, including pre-school through older adults, that targeted behavior and motivation were more likely to result in at least some behavioral change than interventions that focused on dissemination of information with the assumption that such information will result in changes in attitudes and behaviors.

For example, in a study on the effects of an information-based nutrition education program for 6<sup>th</sup> and 7<sup>th</sup> graders in a school setting, Lindholm, Touliatos & Wenberg (1984) measured changes in knowledge and dietary quality. The intervention included skits, written materials and informational posters in the cafeteria. A comparison of pre- and post-test scores indicated a change in knowledge regarding basic nutrition but failed to show an improvement in dietary quality.

Similar results were found in an intervention measuring consumer nutrition knowledge and behavior in Minneapolis-St. Paul area supermarkets (Jeffery et al, 1982). An experimental design was conducted comparing nutritional knowledge of shoppers and sales of dairy products between four experimental stores and four control stores over a 10-month period. The intervention included informational posters, shelf signs and brochures in the store dairy section over a 10-month period. Again, nutrition knowledge increased in both samples; yet, there were no differences in sales of reduced fat dairy products between experimental and control stores.

More positive results have been obtained among secondary health promotion programs involving behavioral change components. The Multiple Risk Factor

Intervention Trial (MRFIT) was a randomized clinical trial measuring dietary intake, weight and blood pressure of middle-aged men at high risk of coronary heart disease over a six-year period (Caggiula et al, 1981; Caggiula and Watson, 1992). The intervention involved ten weekly group sessions including the participants' wives and included food preparation and behavioral self-management skills. Results indicated significant and sustained decrease in cholesterol and saturated fat, an increased intake of polyunsaturated fat, weight loss and decrease in serum cholesterol as compared to the control group.

Another worksite program showed similar results at the primary prevention level. Shannon et al. (1987) used an experimental design to evaluate the effects of weekly group sessions conducted over nine weeks for 75 blue- and white-collar workers at a petroleum refinery and a chemical plant randomly assigned to intervention and control groups. Sessions for the intervention groups included information and behavior modification components. Pre- and post-tests measured knowledge, attitudes, food frequency, body weight and leisure time activity. As observed in the MRFIT trial, participants in the experimental group showed significantly greater improvement in attitude toward the importance of nutrition, eating behavior, leisure time physical activity and weight loss than participants in the control group. Significant change in knowledge occurred at only one site.

Results of these studies and several other evaluated interventions (Contento, I., et al, 1995) indicate the importance of approaching nutrition education planning with a behavioral focus rather than merely information-based objectives. As the data has proven, a change in nutrition knowledge is not an indicator or predictor of nutrition behavior. Furthermore, factors influencing nutrition behavior are complex. Achieving better understanding of these factors, based on a theoretical framework, will provide

valuable insight necessary for nutrition program planners to create effective learning experiences and change dietary behaviors.

### Purpose and Significance of the Study

Specific dietary behaviors, such as an increase in fruit and vegetable intake, are associated with the prevention and control of the leading chronic diseases in the United States. The 5 a Day for Better Health Program is dedicated to the goal of each American consuming five servings of fruits and vegetables daily. Although the general population falls short of this goal, specific subgroups of the population are more deficient and may require targeted intervention to eliminate this disparity.

Given the disparity and minimal evidence of focus on effective nutrition education for the young adult and male population groups, this study investigates this particular subgroup. Although the literature review will show that there has been some examination of the determinants influencing general nutrition behaviors among young adults, these studies have focused predominantly on male and female college students. Evidence will be presented that preliminary research has begun to target the differences in eating habits among student and non-student populations; yet, these studies are primarily exploratory and descriptive. Furthermore, there is no evidence that research on the motivational factors related to specific nutrition behaviors has been conducted among non-student young adults, specifically among those in a worksite environment.

Thus, this study specifically examines motivational issues related to the intention for young adult males to engage in a specific positive nutrition behavior in the worksite setting within the framework of a theoretical model. The specific nutrition behavior, fruit intake, was selected for several reasons: positive nutritional value, specificity and



potential convenience. Several studies of adults have focused on avoidance-type behaviors, such as reducing fat or sugar intake, or recommendations to increase a general class of nutrients, such as fiber. In contrast, this study focuses on the motivation to increase or add a specific food or food group to the diet. Fruit was selected over vegetables because of its perceived compatibility with the worksite setting. Minimal preparation, versatile storage and convenience of fruit are more favorable; therefore, perceived as a more likely behavior to adopt in this environment.

Results of this investigation will provide specific beliefs and factors that can be targeted to influence the intention to eat fruit and improve fruit consumption among young adult males in a work environment. This information will be valuable to health and nutrition educators working with this population and in this setting. Also, this study will provide additional insight to the relationship of motivation to food consumption behavior and augment research regarding the utility of a theoretical approach to understanding nutrition behavior.

## CHAPTER II

### LITERATURE REVIEW

To explain human behavior and to ultimately influence it, the health educator must first understand the individual. In addition, to effectively change nutrition-related behaviors, the educator must understand the factors that influence food selection and consumption behavior.

Several theories or models are effective to explain individual behaviors and predict the determinants of behavior, while a few specific theories are especially effective to explore health related behaviors. The first part of this literature review is dedicated to the discussion of a group of such theories, the value expectancy theories. The Health Belief Model, the Theory of Reasoned Action, and the Theory of Planned Behavior are defined and reviewed for their utility in examining the specific health behavior of interest in this study. Then, the second part of this literature review outlines the factors found to influence nutrition behavior. This outline provides insight to the complexity of nutrition related behavior and justification for each construct included in the proposed research model. Finally, the strengths and weakness of the proposed model are presented with a discussion of methods to overcome weaknesses, followed by a delineation of the research objectives.

#### Value-Expectancy Theory

Value-expectancy theories explain individual behavior based on the individual's

beliefs and attitudes. The theories take into account the beliefs about the consequences of performing a given behavior and the evaluations associated with the different outcomes. Thus, behavior is a function of the subjective value of an outcome and the subjective probability (expectation) that a particular action will achieve that outcome (Glanz, Lewis, & Rimer, 1997). When reformulated in the context of health behavior, the translations are 1) the desire to avoid illness or get well (value) and 2) the belief that a specific health action available to a person would prevent (or ameliorate) illness (expectancy). For example, if an individual believes reducing their risk of cancer is important and they believe that eating five or more servings of fruits and vegetables each day will reduce this risk, their behavior will follow. He/she will continue (or make changes) to consume five or more servings of fruits and vegetables each day as long as this consequence is perceived as valuable.

Several value expectancy theories have evolved to address the determinants of individual health related behaviors and develop methods to stimulate positive behavior change. In this review, some of these theories, the Health Belief Model, the Theory of Reasoned Action, and the Theory of Planned Behavior, are presented and discussed.

### Health Belief Model

The Health Belief Model (HBM) applies the concepts of the value-expectancy theory to the exclusive study of health-related behaviors. The original theory postulates that health-related action depends on the simultaneous occurrence of four factors: 1) the knowledge and acceptance that one is susceptible to a health threat, 2) the belief that the health threat and subsequent consequences are severe, 3) the assurance that action would reduce susceptibility, and 4) the conviction that the benefits outweigh the barriers to

action. More recently, the concept of self-efficacy was added to the HBM to increase its explanatory power for lifestyle behaviors requiring long-term change. Bandura (1977) argued that, in addition to the occurrence of the four original factors, action would depend on an individual's feelings of competence to overcome perceived barriers to action. Thus, lack of self-efficacy would be considered a perceived barrier (Glanz, Lewis, & Rimer, 1997).

The HBM has been one of the most widely used conceptual frameworks in health behavior, used to both explain change and maintenance of health behavior and as a guideline for health behavior interventions. Some preventive health and screening behaviors studied have included practicing breast self-examinations, high blood pressure, using a seat belt, exercising, paying attention to nutrition and stopping smoking (Janz & Becker, 1984). Summary results of the Janz and Becker review article provide substantial empirical support for the HBM, with the component of perceived barriers as the most powerful predictor among the HBM dimensions across all studies and behaviors. When comparing preventive health behaviors to sick-role behaviors, perceived susceptibility was a stronger predictor of preventive behavior and perceived benefits were weaker (Glanz, Lewis, & Rimer, 1997). These findings are of particular interest when considering the appropriate model selection to investigate a health preventive behavior, such as positive nutrition practices.

Given the strength of the HBM to predict health promotion behaviors based on perceived susceptibility, its utility in studying the health behavior of interest in this research project is diminished. Young adults do not generally perceive themselves as susceptible to long-term diseases such as cancer, diabetes and stroke. According to the theory, health-related action would fail to occur in the absence of at least one of the four

essential factors. Thus, the study of motivation for young adults to engage in a positive nutrition practice would be compromised using this model.

### Theory of Reasoned Action

According to the Theory of Reasoned Action (TRA) (Ajzen& Fishbein, 1980), beliefs, or information representing the subjective world of the individual, explain a person's behavior. Thus, the TRA interprets social behavior at the level of individual decision-making. Within the TRA (Figure 1), individual intention to perform a behavior

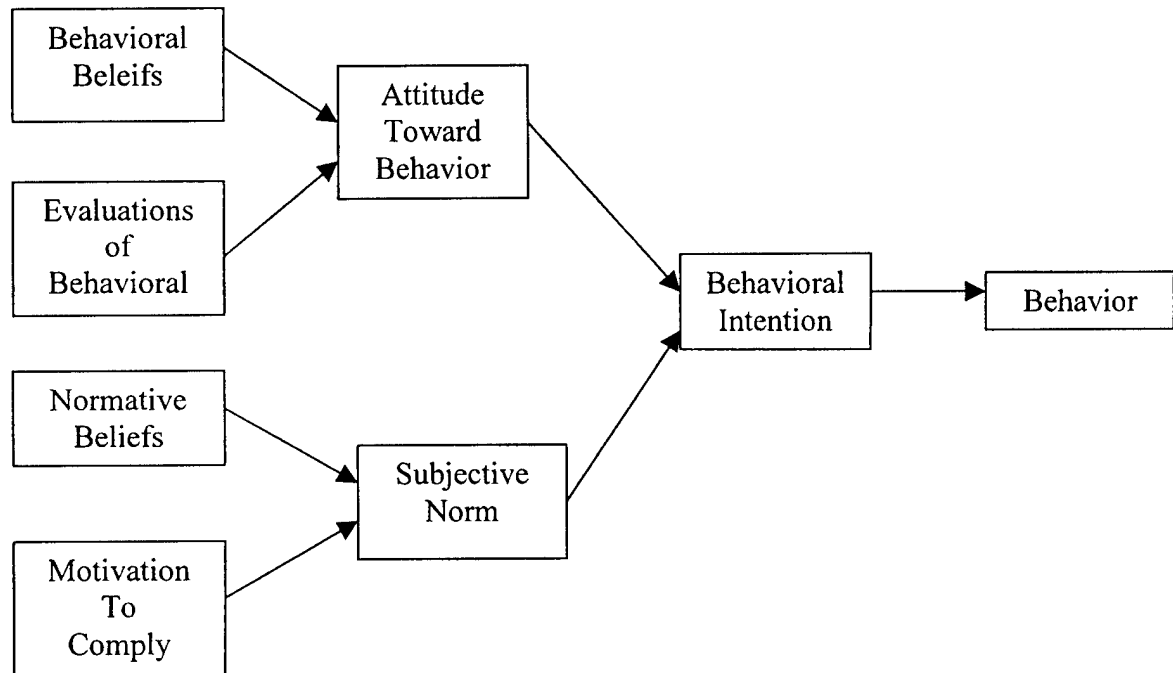


Figure 1. Theory of Reasoned Action

is considered to be the immediate determinant of action. Beliefs are direct antecedents to intentions and are a function of both personal and social determinants. Personal determinants reflect the individual's attitude toward a specific behavior, or the relative value of outcomes to be achieved by performing that behavior. Social determinants refer

to subjective norms, or the perceived expectations of others related to a specific behavior and individual motivation to comply with these expectations. Additional variables, such as personality or socioeconomic status, affect behavior through their influence on the attitudinal and normative components of the model.

The TRA has been used to investigate a variety of general health behaviors and specific nutrition-related behaviors. Behavioral intention has been successfully predicted for health related behaviors such as alcohol consumption (Budd & Spencer, 1984), contraceptive use (Scmelling, 1984), exercise (Ewald & Roberts 1985) and the use of seatbelts (Wittenbinker, Gibbs, & Kahle, 1983). Among nutrition behaviors, TRA has been used successfully to predict the intention to reduce dietary intake of fat and sugar (Saunders & Rahilly, 1990), eat at fast food restaurants (Axelson, Brinberg, & Durand, 1983), eat sweet snacks (Grogan, Bell, & Connor, 1997), and consumption of selected fat- containing foods (Tuorilla & Pangborn, 1988). Overall, a meta-analysis of the theory (Sheppard, Hartwick, & Warshaw, 1988) indicated the model successfully predicts behavior and is useful for identifying where and how to target strategies for changing behavior.

#### Theory of Planned Behavior

Although the TRA has been successful in predicting a variety of behaviors, the predictive power of this model is limited to behaviors considered as being under an individual's control. Several factors, however, are believed to influence volitional control over behavior. These factors may be internal to the individual and include skills, abilities, and knowledge necessary for doing a behavior; or, these factors may be external to the individual such as resources, time, opportunity, or dependence on others (Ajzen, 1985, 1988).

In an effort to account for factors outside the individual's control that may affect his intention and behavior, Ajzen expanded the TRA. The Theory of Planned Behavior (TPB) (Ajzen,1985) extends the TRA to include the construct of perceived behavioral control as an additional antecedent to intention. Perceived control refers to the perceived ease or difficulty inherent in achieving a desired outcome and is assumed to reflect past experiences as well as perceived ability to overcome anticipated obstacles. Thus, according to the TPB, the more favorable the attitude and subjective norm with respect to a specified behavior and the greater the perceived control over behavioral outcomes, the stronger the individual's intention to initiate the behavior. Perceived control can influence intention, as can attitudes and subjective norms (Figure 2). Or, it can predict behavior

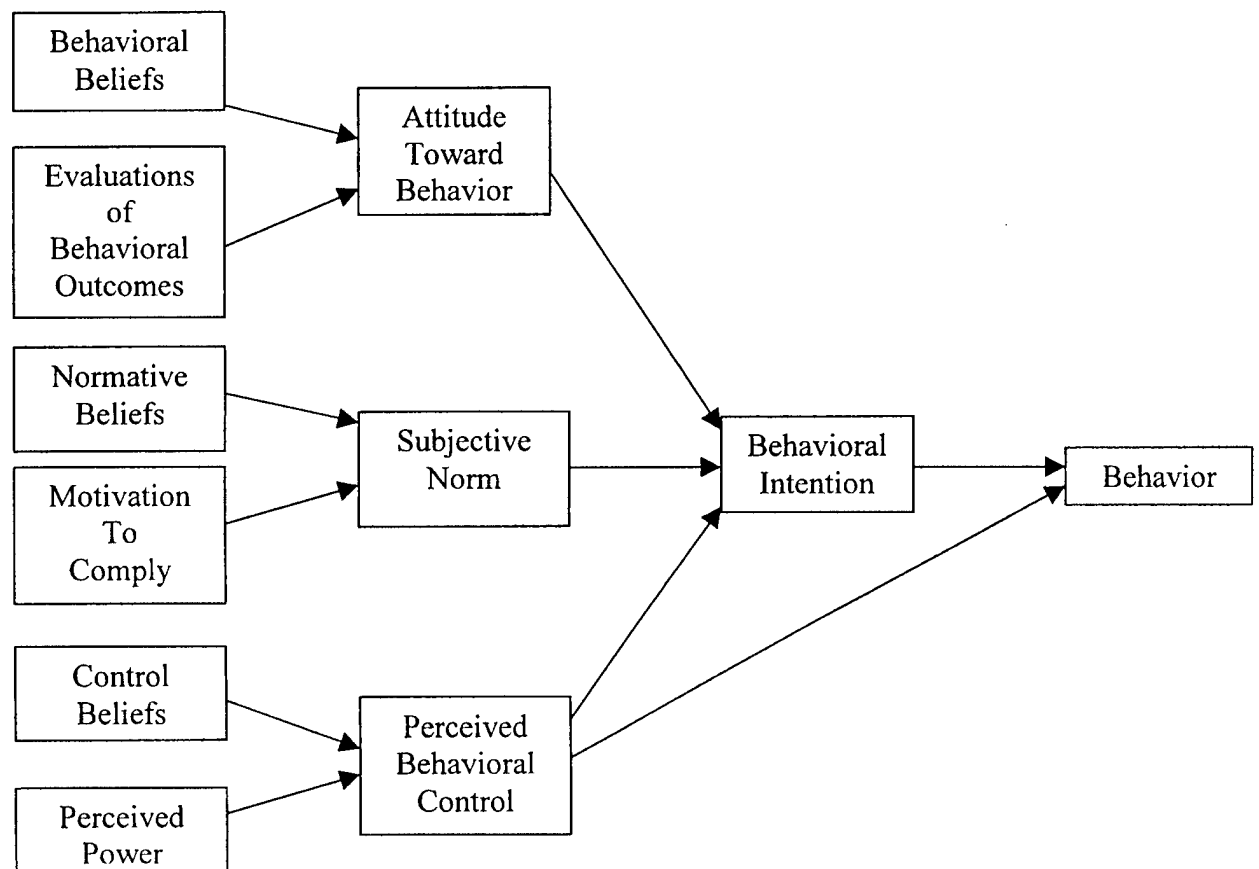


Figure 2. Theory of Planned Behavior

directly in conjunction with intention, in situations where behavior is not under individual control.

The TPB has been used and tested for over a decade on a variety of behaviors (Schifter & Ajzen, 1985; Ajzen & Madden, 1986; Madden, Ellen & Ajzen, 1992; Godin & Kok, 1996; Nguyen, Otis, & Potvin, 1996). In most of these studies, the researchers focused on the contribution of perceived behavioral control to the utility of the model in predicting intention and behavior.

The early studies specifically tested the added value of the perceived behavioral control construct to the original constructs included in the TRA. Schifter & Ajzen (1985) used the model to examine weight loss intention and actual weight loss among female college students. As hypothesized, all three components of the model contributed to the prediction of intention to lose weight. In addition, intention and perceived behavioral control predicted actual weight loss, supporting the direct association between perceived control and actual behavior. In a subsequent investigation regarding academic behavior, Ajzen and Madden (1986) tested the role of perceived behavioral control in predicting behavioral goals among undergraduate students. Two behaviors were used to represent different degrees of control over the behavior. The behavior representing high control was defined as attending class regularly while earning an A in the course was the behavior requiring specific skills. In predicting actual behavior, the addition of perceived control to the intention contributed to the prediction of getting an A in the course, while it added little to the prediction of attending class regularly. In predicting intention, perceived control improved the prediction for both behaviors and supported the TPB.

Madden, Ellen, & Ajzen (1992) later tested 10 additional behaviors with varying degrees of control over performance. Over the range of behaviors, the results indicated



that inclusion of perceived behavioral control enhances the prediction of behavioral intention and behavior. Consistent with the TPB, the effects of perceived behavioral control on a target behavior are greater when the behavior lacks some degree of behavioral control.

In a review of the application of the TPB to the study of health related behaviors, Goden & Kok (1996) also found the model to be significantly predictive of intention and behavior. The researchers reviewed articles applying the TPB to addictive, automobile-related, screening, eating, exercising, HIV-AIDS, and oral hygiene behaviors. The results indicated that the theory performs very well for the explanation of intention with an averaged  $R^2$  of .41. Attitude toward the action and perceived behavioral control were most often the significant variables responsible for this explained variation in intention. For the prediction of actual behavior, the average  $R^2$  was .34. Intention remained the most important predictor of behavior; yet, in half of the studies reviewed, perceived behavioral control significantly added to the prediction.

The added value of the perceived behavioral control construct to the TRA components has also been shown to be significant with regard to specific nutrition-related behaviors (Madden, Ellen, & Ajzen, 1992; Nguyen, Otis, & Potvin, 1996). Two of the 10 behaviors studied by Madden, Ellen, & Ajzen (1992) to test the predictability of the TPB on behaviors with varying degree of control were nutrition related (use of vitamin supplements and avoidance of caffeine). Prediction of the intention to perform the behavior was improved significantly by the inclusion of perceived behavioral control in the model. On the other hand, the predictability of the model with respect to actual behavior varied depending on the degree of perceived control over the behavior. As expected, when the behavior was perceived to be under high volitional control (use of

vitamin supplements), perceived behavioral control made no significant contribution to the prediction of the behavior. When the behavior was perceived to be under moderate to low volitional control, perceived behavioral control made an increasingly significant contribution to the prediction of the behavior.

In another study, the TPB was used to identify the determinants of intention to have a low-fat diet among 30-60 year old men. Results indicated the model significantly contributed to identifying the variables influencing the behavioral intention explaining 51% of the total variance. It also revealed the significant influence of all three factors in the model – attitude, subjective norm, and perceived behavioral control. These researchers were also able to demonstrate the utility of the model in identifying specific factors to target and create effective nutrition interventions in a high-risk group.

Given the strong empirical evidence supporting the predictive power and practical applications offered by the TPB, this model seems to be an appropriate choice to investigate behavior with decreased volitional control. The behavior of interest in this study, nutrition-related behavior, has been shown to be highly complex. Each food selection decision is believed to be influenced by a multitude of inputs including attitudes, social environment, and control factors. The following evidence is presented to explore the role of each of these factors in food selection behavior and evaluate the potential contribution of each construct in the TPB to the study of the behavior of interest.

## Influences on Nutrition Behavior

### Attitudes and Beliefs

Although the specific association between beliefs, attitude and behavior has been challenged in the literature (Ajzen & Fishbein, 1980), beliefs and attitudes are generally accepted as influential factors in the prediction and explanation of human behaviors. Green & Kreuter (1991) describe the principle elements of attitude to include a rather constant feeling that is directed toward an object and that includes an evaluative component that involves a positive-negative dimension. This description of attitude coincides with the operational definition given by Fishbein and Ajzen (1975, pg. 6); “attitude can be described as a learned predisposition to respond in a consistently favorable or unfavorable manner with respect to a given object.” A belief, on the other hand, is the conviction that a concept or object is true or real (Green & Kreuter, 1991). According to Fishbein and Ajzen (1975), beliefs and attitudes are not directly linked to behavior. Instead, beliefs influence attitudes, attitudes affect behavioral intentions, and intentions predict behavior. Using this model and various other measures, researchers have demonstrated an association between attitudes and beliefs toward nutrition and various nutrition behaviors.

Research investigating the link between attitude toward nutrition and actual behavior has been conducted on both the general population and specific target groups and range from general behaviors to specific food selection. For example, McFarlane & Pliner (1997) investigated the varying influence of nutrition information on the willingness to try novel foods among individuals in the general population who do or do not think nutrition is important. Four hundred and one volunteers between the ages of 10-76 responded to questionnaires measuring beliefs and attitudes, were provided nutrition

information regarding several novel foods, and were given the opportunity to try these foods. The researchers found that the subject's beliefs and attitudes toward nutrition significantly influenced their willingness to try the new foods. Specifically, the subjects who believed nutrition is important had increased willingness compared those who did not believe nutrition is important.

Similar results were found in a study on the predictors of dietary change in a behavioral intervention to improve eating habits (Smith, Baghurst, & Owen, 1995). The researchers used an experimental design to examine whether socioeconomic status (SES) and selected aspects of knowledge, beliefs, and attitudes were related to dietary behavior change in volunteers for a nutrition education program. The factors of interest included 1) the belief that diet is a cause of disease, 2) confidence in the ability to maintain a healthy eating pattern, 3) feeling of personal control over dietary intake, and 4) knowledge of a healthy eating pattern. Among the subjects in the intervention group, there were no differences in SES between those who adopted two or more dietary changes and those who adopted less than two dietary changes. Factors significantly correlated with making two or more behavior changes were 1) the belief that diet has a causative role in the development of high blood cholesterol, obesity and heart disease, 2) nutrition knowledge, 3) confidence about making dietary changes, and 4) notification of elevated blood cholesterol. These findings provide further evidence of the association between specific beliefs and behavior among a volunteer population that would most likely already rank nutrition as important.

Other investigators have conducted cross-sectional studies to examine the attitudes and beliefs linked to current behaviors. French, et al. (1999) examined the cognitive and demographic correlates of low-fat vending snack choices among

adolescents and adults. Subjects were a convenience sample from 12 high schools and 10 worksites. Each participant was surveyed to assess motivation, beliefs, and self-efficacy regarding low-fat vending snacks, current snack choices, and intended snack-choice behavior. Results indicated snack taste was rated as the most important factor in current and intended behavior followed by price. Other variables positively associated with current and intended low-fat vending snack choices were positive beliefs about low-fat vending snacks, higher ranked importance of snacks with fewer calories and less fat, self efficacy and desire to choose a low-fat snack and interest in monitoring weight. Variables inversely associated with intention and low-fat snack selection behavior were the importance of snack taste, price, friends' taste preferences, value, inclination to try a new snack, buying habit, hunger level, and attractive packaging. A study conducted in the United Kingdom (UK) found similar beliefs and attitudes associated with current red meat consumption (Richardson, Shepard, & Elliman, 1993). Investigators administered a belief and evaluation questionnaire among a random sample of UK residents and found taste, health, and value were the significant factors associated with intention and current meat consumption behavior. Similar to the snack-selection behavior, consumers of more of the less nutritionally desired food (red meat), ranked taste as a significant factor; while consumers of less red meat ranked health as a significant factor. Generally, both studies support the association between attitudes toward an eating behavior and that behavior in the general population.

Numerous studies have found an association between beliefs, attitudes and nutrition behaviors among young adults but most are limited to university student populations (Saunders & Rahilly, 1990; Tuorila & Pangborn, 1988; Axelson, Brinberg, & Durand, 1983; Grogan, Bell, & Connor, 1997). Betts, et al. (1997) recently investigated

how young adults (18-24 years old) view their food choices in general. In addition, this study is one of the first to specifically target and compare non-students to a student population. Randomly selected subjects in 10 states were mailed a questionnaire measuring demographics, rating of importance of nutritional aspects of foods, the degree of adequacy perceived in facilities for and skills in shopping and preparing foods, and food frequency. The mailing also included a repertory grid including the 20 most commonly consumed foods by 18-24 year olds and constructs found to influence the food intake of young adults. Commonly consumed foods were based on the 1987-1988 Nationwide Food Consumption Survey and constructs were determined from previous focus group research (Betts, Amos, Georgiou, et al., 1995).

Factor analysis of the total sample indicated four underlying ways in which foods were viewed that explained 51 percent of the variance. These included the physical and social characteristics of food (looks good to eat, tasty, friends eat, eaten out, and habit) (F1), fattening and healthy (F2), shopping skills (get most for money, read labels, importance of nutrition, and adequate money) (F3), and adequacy of grocery stores and cooking facilities (F4). Results varied slightly for students and non-student subgroups. For students, convenience was included in the first factor and importance of nutrition was excluded from F3 ( $R^2 = .53$ ). For non-students/non-graduates, importance of nutrition was also excluded from F3 and a fifth factor (F5), a strong perception of the satiety value of food, was included ( $R^2 = .57$ ). Correlation between frequency of food item consumption (behavior) and the factors generated in factor analysis were significant ( $p < .01$ ). While other factors such as control and habit were related to the behavior in this study, the association between attitudes, beliefs and behaviors is upheld as a significant factor in food selection among young adults.

Another study examining beliefs, attitudes and nutrition behavior among young adults focused on a less specific behavior. Oygrad and Rise (1995) used the Theory of Planned Behavior to predict the intention to eat healthier foods among 23-26 year old adults in Norway. The dual purpose of their investigation was 1) to report the relative contribution of attitude, subjective norm, and perceived behavioral control in predicting the decision to eat healthier food and 2) to give a detailed analysis of the underlying cognitions with particular reference to which of them discriminate between those who intend, who do not intend or are undecided on eating healthier food. For predicting the intention to eat healthier foods (defined as foods with low quantity of fat, sugar and salt), attitude was most significant, followed by perceived behavioral control and subjective norm. Specifically, beliefs which included 'get me into better shape,' 'help me reduce my weight,' and 'make me enjoy my food more' were significantly more important among intenders than non-intenders. Although the behavior was less defined, important beliefs and attitudes toward a general healthy eating behavior were identified and differentiated among young adults.

The specific behavior among young adults of interest in this study is the consumption of fruits. Baseline research for the 5 A Day for Better Health program suggests there may be an association between several factors, including attitudes and beliefs, and the consumption of fruits and vegetables among the general population. Krebs-Smith, et al. (1995) found that of the factors investigated, the most important in determining a person's intake were the number of servings believed he/she should have each day, whether the individual liked the taste of fruit and vegetables, and whether they had been in the habit of eating fruits and vegetables since childhood. Keim, Stewart, & Voichick, (1997), conducted a similar study as Betts, et al (1997) on young adults and

their attitudes toward specific foods. Yet, Keim, Stewart, & Voichick, (1997), specifically investigated fruit and vegetable intake and perceptions in this age group. The purpose of this study was to determine behaviors associated with eating fruit and vegetables, types consumed, and the presence of a relationship between underlying perceptions about fruits and vegetables and relative consumption. Methods were the same to that of Betts, et al. (1997).

Results of factor analysis conducted separately for reparatory grid responses for the five vegetables and fruits tested (apple, orange juice, fried potatoes, tomato, and broccoli) indicated two underlying factors that explained 41-51% of the variance for each of the five items. These factors included sensory and social perceptions (tasty, a habit to eat, eaten out, and looks good to eat) (F1), and health and fattening perceptions (F2). As evidence of the varied influence of attitude and beliefs on consumption of specific foods, consumption of each of the foods was correlated significantly ( $p < .0001$ ) with F1 while only broccoli and fried potatoes were correlated with F2. One explanation for this inconsistency between the attitude and behavior may have been in the belief statement. According to Ajzen and Fishbein (1975), measuring an attitude toward an object is less predictive of behavior than measuring an attitude toward a behavior with respect to that object. In this case, the investigators were measuring the beliefs associated with the food rather than beliefs associated with the act of eating the food. Despite this discrepancy, the study contributes to the body of evidence supporting the association between beliefs, attitudes and nutrition-related behaviors; specifically, this study introduces this association among young adult cognition and fruit and vegetable consumption behavior.



### Social Environment

Another important factor to consider with respect to behavior is the potential influence of an individual's social environment on their choices and actions. Social environment has been described as being made up of three groups: primary (including family and others very close to the individual), reference (what the individual thinks of as my kind of people), and role models (those the individual wants to follow) (Jenkins, 1979). These referent groups may influence the individual in a variety of ways such as 1) telling the individual what to believe, 2) showing the expectation of behavior change, 3) directly controlling the environment, 4) supporting emotionally or instrumentally, 5) supporting by changing their own behavior, and 6) encouraging and reinforcing an effort to make behavioral change (Zimmerman & Connor, 1989; Israel, 1982; House, 1981). Some of these facilitators or reinforcers of behavior change are measured in the normative component of the TRA and TPB. The subjective norm construct measures a person's perception that most people who are important to them (referent groups) think they should or should not perform the behavior in question (Ajzen & Fishbein, 1980).

Evidence suggests social environment can have a varying influence on nutrition attitudes and behavior, depending on the specific behavior and the population of interest. For example, studies investigating the effects of social support on behavior change as a result of intervention are favorable. The family and spouse have been recognized as a major source of support in the development of heart healthy eating practices. Johnson & Vickery (1990) found supporting evidence when examining the attitudes, nutrition knowledge, and selected heart healthy practices in a sample of coronary heart disease patients attending cardiac rehabilitation. Eighty-six percent of subjects noted a family effort to comply with a heart healthy dietary regime and the study found a significant

association existed between dietary practice and the indication of a supportive household. Similar results were found for a weight loss intervention. Shannon, et al. (1990) examined the role of perceived self-efficacy, outcome expectancy, family and friend support and knowledge on behavior. The study was conducted during a 10-week weight loss program with evaluation occurring prior to the program, at the end of the program and at a two-month follow-up. A significant relationship emerged between social support and self-efficacy prior to the program and at the two-month follow-up. These results suggest that a supportive social environment positively influences self-efficacy that may, in turn, influence eating behavior.

Another study investigating the added benefit of social support on the outcome of a nutrition intervention focused on the specific influence of both coworkers and family members (Sorensen, et al, 1999). The Treatwell 5 A Day study included an intervention aimed to build support for behavior change from coworkers, household members and the worksite environment. A randomized controlled research design included a control group and two treatment groups. All groups (control and treatment) received periodic exposure to the 5 A Day campaign information. The 'worksite' and 'worksite plus family' treatment groups added worker participation in program planning and implementation, programs aimed at individualized change, and programs aimed at changes in the worksite environment. The 'worksite plus family' treatment group also received a series of family oriented programs. Results indicated there was a significant increase in fruit and vegetable consumption among the treatment groups compared to the control group. Specifically, the difference in intake between the 'worksite plus family' treatment group and the control group was significant while the difference between the 'worksite'

treatment group and the control group was not. These results support the evidence that the social environment plays a role in dietary behavior change.

On the other hand, the influence of social support on the everyday behaviors involving diet and nutrition seems to vary among young adults. Evidence suggests social support may or may not be a factor depending on the eating behavior investigated, the gender of the subjects, and the current knowledge or attitudes of the subjects (Oysgard & Rise, 1996; Axelson, Brinberg, & Durand, 1983; Grogan, Bell, & Connor, 1997; Saunders & Rahilly, 1990). Oysgard & Rise (1996) used TPB to predict the intention to eat healthier foods among 23-26 year old adults in Norway. Researchers found behavioral intention correlated with each construct: attitude, subjective norm and perceived behavioral control. Although subjective norm was the least significant, it did contribute to the predictability of the model for the behavioral intention to eat healthier among young adults. Yet, a study on the behavior to eat at a fast food hamburger restaurants among college students found the opposite result (Axelson, Brinberg, & Durand, 1983). Using the TRA, researchers found that the normative component of the model did not contribute significantly to the prediction of intention, indicating the young people in this study were not influenced by their referent groups with regard to their intention to eat at a fast food restaurant.

Other studies show conflicting results on the influence of the social environment with respect to same behavior among subjects of different genders or college major. Grogan, Bell, & Connor (1997) used the TRA to investigate the predictive power of attitudes and social influence in relation to men's and women's intention to eat sweet snacks. For women, the best predictor of intention and current consumption included the perceived pleasantness (attitude), perceived healthiness (attitude), and social influence

(subjective norm). For men, on the other hand, the best predictor included perceived pleasure (attitude) and perceived healthiness (attitude). Social influence was not a significant predictor of intention or current consumption for males. Another study used TRA to investigate the influences on intentions to reduce dietary intake of fat and sugar (Saunders & Rahilly, 1990). The researchers hypothesized that both the attitude toward the behavior and the subjective normative components would predict intention to reduce dietary intake of fat and sugar in the whole sample. Yet, specifically, they postulated that the attitudinal component would be more important for health majors and subjective norm would be more important for non-health majors in explaining the variance in intentions. Results of their investigation were consistent with this hypothesis suggesting the differences in attitudes and beliefs among some populations may alter the impact of social influences on behavior.

A summary of the findings on the role of the social environment on nutrition related behavior indicates a wide variation in results. Although evidence is strongly supportive of the role of social support with regard to behavior change, the literature is less conclusive with respect to daily nutrition behaviors in the absence of disease or intervention. The need for more evidence supports the measurement of subjective norms with respect to fruit and vegetable consumption among a specific healthy population.

### Perceived Behavioral Control

Despite an individuals attitude and/or social influences, in situations where volitional control over a behavior is low, perceived behavioral control can be a significant factor in predicting behavioral intention and behavior (Ajzen & Madden, 1986). As discussed in the introduction to the TPB, perceived behavioral control is a construct that

considers control factors on two different levels. First, control can be a motivational issue, such as self-efficacy. According to Bandura (1977), self-efficacy is an individual's judgement of how well he or she can perform a behavior under various inhibiting circumstances. Thus, people tend to pursue tasks they know they can accomplish (high self-efficacy) and avoid those they believe exceed their capabilities (low self-efficacy). Secondly, control can be a tangible factor, such as the presence of skills, resources, or costs. Evidence supports the effect of both dimensions of control on health and nutrition related behaviors.

#### Motivational Control Factor

In a comprehensive review of the literature published on the relationship between several cognitive predictors of health and nutrition related behaviors (AbuSabha & Achlerberg, 1997), the authors found self-efficacy has repeatedly been a good predictor of health behavior, often explaining more than 50% of variability. It has been related to smoking cessation and maintenance, exercise, contraceptive use, cardiac rehabilitation, weight loss and nutrition. In addition, it appears as a significant predictor of health promotive behaviors across ethnic groups (Weitzel & Waller, 1990). In a convenience sample of blue-collar workers, the investigators found self-efficacy to be an important determinant of health promotion behavior (self-actualization, health responsibility, nutrition, exercise, interpersonal support, and stress management) for whites, Hispanics and African Americans.

Given the promising predictive power of self-efficacy in the general population for a variety of health behaviors, practitioners and researchers have measured its role in the effectiveness of nutrition interventions. Shannon, et al. (1990) examined the role of

perceived self-efficacy as a mediating factor between the social environment and behavior in a 10-week weight management program. A pencil/paper instrument was administered prior to the course, at the end of the course, and at a two-month follow-up. Self-efficacy emerged as a consistent determinant of eating behavior prior to the intervention and a predictor of change in behavior at the 2-month follow-up. Another study in Australia showed an association between confidence level of participants to make dietary changes and their actual change in behavior (Smith, Baghurst, & Owen, 1995). The researchers implemented an experimental design to examine whether SES and selected aspects of knowledge, attitudes, and beliefs were related to dietary behavior change in volunteers for a nutrition education program. Among the intervention group, there were no differences in SES and gender between the participants who adopted less than two dietary changes and those that adopted two or more changes. Yet, confidence about making dietary changes was significantly correlated to subjects making more dietary changes.

With the exception of studies on the role of self-efficacy on dietary behavior change (primarily weight-loss behavior), research is limited on the role of self-efficacy in specific food selection behaviors. Oygard & Rise (1996) used the construct of perceived behavioral control in an attempt to investigate the role of self-efficacy in the intention to eat healthier foods among young adults in Norway. In this study, perceived behavioral control contributed significantly to the explained variance and was second to attitude in predicting behavioral intention. Specifically, when intenders were compared to non-intenders, intenders expressed significantly greater confidence in their ability to change their eating behaviors. For a more specific food choice behavior, French et al. (1999) showed similar results. The investigators examined the demographic and social-

psychological correlates of current and intended low-fat vending snack choices among adolescents and adults. In addition to positive attitudes and beliefs regarding low-fat snacks, self-efficacy to choose a low-fat vending machine snack positively correlated with current and intended low-fat vending snack choices. Again, similar results were found for a positive nutrition behavior. Havas, et al. (1998) assessed the extent sociodemographic and psychosocial characteristics predicted consumption of fruits and vegetables in women participating in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC). Three thousand women enrolled at 15 sites were surveyed and results showed sociodemographic variables were not powerful predictors of fruit and vegetable consumption. On the other hand, self-efficacy, attitudes, and perceived barriers (availability, expense, and perishability) emerged as significant predictors of consumption with self-efficacy being the strongest predictor.

#### Tangible Control Factors

In addition to motivation-related control issues, such as self-efficacy, tangible control elements can significantly enable an individual to perform a behavior or create a barrier to that behavior. These elements include availability or accessibility of resources (convenience), the presence of necessary skills, and the perceived or actual cost of performing the behavior. Given that these factors are associated with healthy food selection, purchase and preparation, it is expected that actual control would be predictive of nutrition related behaviors.

Several studies support this hypothesis (Lappalainen, et al., 1997; Domel, et al., 1996; Gracey et al, 1996; Jack, Piacentini, & Schroder, 1998). For example, Lappalainen, et al. (1997) conducted a cross-sectional study of individuals from 15 countries in Europe

to determine factors perceived to be important barriers to healthy eating. Although the researchers found there was great variability in perceived barriers, the most frequently mentioned obstacle to following nutrition advice was lack of time. Jack, Piacentini, & Schroder (1998) investigated beliefs and control perceptions regarding the selection and intake of fruit among a specific population. The researchers selected Scottish lorry drivers for their irregular and demanding schedules and their limited access to wholesome foods. In a qualitative analysis, snacking emerged as the predominant feature of eating patterns in this population and the most significant benefit of snack foods was their perceived convenience (expressed in terms of ready access, storability, and predictability of eating quality). Subsequent quantitative analysis of snack preferences in the same population found that fruit, although perceived as healthy, was not preferred because it was considered inconvenient and expensive.

In studies on school children, access and availability of healthier foods also appeared to be a mediating factor on consumption. Domel, et al. (1996) investigated psychosocial predictors, specifically self-efficacy, outcome expectations, and preferences of fruit and vegetable consumption among fourth and fifth grade students. Results indicated that self-efficacy had a low correlation to fruit and vegetable consumption but was highly correlated to attitude toward fruit and vegetable consumption. Given that self-efficacy was related to a favorable attitude toward fruit and vegetable intake but poorly related to intake, the authors suggested the lack of available fruits and vegetables may be a moderator to the behavior. An investigation on older students was more conclusive. Gracey, et al. (1996) measured knowledge and beliefs about nutrition, behaviors and possible barriers affecting healthy food choices among adolescent students in Australia. The barriers to healthy food selection considered important by the greatest



proportion of students was healthy food not being available at home or at school and the lack of control over food selection at home.

Given the evidence supporting the role of environmental factors in the selection and intake of healthy foods, researchers have tested interventions designed to overcome barriers with positive results (Whitaker, et al., 1994; Jeffery, French, Raether & Baxter, 1994). Whitaker, et al. (1994) conducted a randomized intervention to determine whether children would increase their selection of low-fat foods in school lunches if these foods were made available more often and labeled on the menu. By increasing availability of a low-fat entrée alternative from 23% of days to 71% of days, the researchers were able to increase selection of low-fat entrees from 9% at baseline to 25%. An environmental intervention to increase fruit and salad purchases in a public cafeteria also changed food selection behavior (Jeffery, French, Raether, & Baxter, 1994). Investigators explored the hypothesis that consumption of fruit and salad in a cafeteria setting would increase if the variety of offerings were increased and the price reduced; therefore, they doubled the number of fruit choices, increased salad ingredient selection by three, and decreased the price by fifty percent. Although the experimental design made it impossible to differentiate between effects, the outcome of the environmental changes resulted in a threefold increase in fruit and salad purchases.

In summary, the evidence presenting the role of motivational and tangible factors in the selection, purchase and consumption of food is overwhelmingly supportive. Self-efficacy and environmental conditions emerge as predictive factors for a variety of health and nutrition related behaviors in various populations. Furthermore, interventions aimed to influence these conditions show a favorable influence on behavior. Thus, inclusion of

the perceived behavioral control construct in studying a specific nutrition behavior appears necessary to adequately predict behavioral intention.

### Limitations of the Theory of Planned Behavior

Despite the body of evidence supporting the TPB and each of its constructs in the study of nutrition behavior, the theoretical model lends some limitations to the study of the specific nutrition behavior of interest. First, the level of specificity in intention required to generate an accurate prediction of behavior limits the application of this model. According to Ajzen (1988), all variables in the model must be at the same level of specificity or generality in terms of target, action, context, and time. Research in the area of nutrition has shown that the more specific the target of the behavior, the greater the variability in behavior is explained by the model. When a high degree of specificity is lost, the model predicts less than 20 percent of variability. The compromise between specificity and practicality is often too great for the researcher to generate significant and meaningful results. Secondly, the use of the model alone in the study of motivation to perform a behavior implies that decisions regarding a specific behavior are made in isolation. The theory fails to account for the “trade-offs” made in most decision-making processes. For example, the decision to eat fruit usually competes with other food choices rather than with the choice to eat nothing. Thus, to strengthen the practical application for the results of this study, these two research limitations must be overcome.

To meet this challenge, two strategies are proposed: 1) employing unique methodology in the elicitation step to address the issue of specificity versus practicality and 2) including measurement scales to assess individual patterns of eating behavior and the importance, or utility, of fruit among the target population.

### Specificity Versus Practicality

In order to address the issue of compromising practicality for the need to obtain specificity in the behavioral target, the researcher proposes a unique elicitation process. According to the protocol set forth by Ajzen and Fishbein (1980), the modal salient beliefs regarding the behavior of interest are obtained by an open-ended elicitation questionnaire in the target population. The questions in this tool are to be worded at the same level of specificity as the behavior of interest, in this case, overall fruit consumption. Yet, the researcher proposes eliciting both at the general level, asking about beliefs regarding the selection of fruit versus other foods, and at a specific level, asking about beliefs regarding the selection of a specific type of fruit versus other specific types of fruit. Eliciting at a more specific level and gathering beliefs common to the different types of fruit is theorized to capture additional salient beliefs than would not be explained by eliciting at the more general level of fruit alone. Additional details of this procedure will be delineated in the methodology of this study.

### Competing Food Choices

The researcher consulted with a marketing expert, who is also a member of the thesis committee, to discuss the concept of studying food selection patterns and the utility of a specific food item as it competes with an individual's other food choices. According to T. J. Madden (personal communication, November 22, 1999), several techniques are available to measure patterns of consumer behavior and to predict consumatory behaviors in the context of competing choices. To measure the typical pattern of food selection behavior at the worksite, Madden proposed an instrument that would measure switching behavior among consumers. To use this instrument, the investigator provides the

participant with a list of products, in this case foods, that the participant may choose in the situation of interest. The participant is asked to first indicate the items they have selected or used in a specified period of time in the past. Then, they are asked to indicate the items they intend to select or use for the identical period of time in the future. Results would indicate whether the typical pattern of food selection behavior is consistent or varied over time.

For the purpose of this study, the researcher would be able to assess whether fruit consumption is a consistent or intermittent behavior. This information would allow the practitioner to tailor their intervention strategies to coincide with typical patterns of behavior.

To assess the utility, or importance, of fruit as it competes with other food choices in the target population, Madden (personal communication, November 22, 1999) proposed several techniques. These techniques are summarized by Dillon, Madden, and Firtle (1987) and include different types of comparative scales: 1) a simple paired comparison, 2) a constant sum scale, and 3) a constant sum scale with paired comparison. Each technique will be presented and discussed in terms of its strengths and weaknesses as they apply to this study.

In comparative techniques, overall, the subject is asked to compare one set of objects directly against another. Thus, the resulting data is interpreted in relative terms and have ordinal or rank-order properties. An advantage of these techniques is that relatively small differences can be detected among the objects being compared. Also, the scales are usually easy for the respondent to understand. Yet, the technique requires differences to be 'forced' to surface since respondents directly compare objects. Nevertheless, this overall technique meets the needs of this study in that food selections

are inevitably 'forced' decisions. Although these selections may change over time, and depend on the situation, this tool would begin to provide information regarding the selection of fruit in the context of other behaviors that is not addressed in the TPB.

The first of these techniques, the simple paired comparison, presents the respondent with two objects at the same time and asks the respondent to select one of the two according to some criterion. The number of comparisons in the scale depends on the number of objects in the comparison. With  $n$  objects, there are  $[n(n - 1)/2]$  comparisons. For example, if there are four foods to compare, there are six paired comparisons. This type of scale is extremely easy to administer and resulting data is easy to interpret. Yet, if several items are included, the scale length can become unwieldy. In addition, because comparisons are done two at a time, respondent's judgment may not obey the rule of transitivity. In other words, respondents may indicate they prefer item A over item B and item B over item C but fail to indicate that they prefer item A over item C. A large number of intransitivities may make the data uninterpretable. The resulting data also does not indicate the degree of preference for each item.

The next technique, constant sum scaling, may be done two ways: with or without paired comparisons. Obviously, constant sum scaling without paired comparison overcomes the problem of having respondents evaluate objects two at a time. Instead, respondents are asked to assign a specified amount of points, usually 100, among the presented alternatives based on some criterion, for example, preference. The points are then allocated based on the degree of preference for each alternative in the context of the other alternatives in the list. Although this method allows a comparison of more than two items at a time and provides some insight to the degree of preference, it is best

administered in an interview setting to ensure the appropriate number of points are allocated. It also is a more cognitively taxing instrument.

A slightly simplified alternative to this method, especially when evaluation of more than a few items is desired, is the constant sum scale used with paired comparisons. This method combines the features of a simple compared comparison with those of the constant sum scale. Respondents are presented with pairs of items and asked to assign a designated amount of points or 'chips,' usually 11, between the two alternatives indicating their degree of preference based on the number of points assigned. This scale is easier to administer with a self-completed questionnaire and is relatively easy to interpret when the items are limited to a reasonable number. Additionally, it provides the researcher with insight on the 'position' a particular food may hold with regard to preference among other competing foods.

Given the information of interest and design of this study, the researcher proposes this technique to assess the utility of fruit in the target population. Further details of the proposed instrument are discussed in the methodology section.

### Research Objectives

Specifically, the research objectives and study design was created to address each of these issues. The objectives of this study are:

1. To elicit salient beliefs for a general class of behavior (i.e. fruit consumption)
2. To elicit salient beliefs for specific food consumption behavior (i.e. apple, orange, banana or seedless grape consumption).
3. To examine salient beliefs for commonality across specific food consuming behaviors

4. To compare modal salient beliefs elicited for a general class of behavior to those elicited for specific food consumption behavior.
5. To create a quantitative instrument based on the TPB protocol using the modal salient beliefs elicited for a general class of food selection behavior (i.e. fruit intake) and for specific food consumption behaviors (i.e. specific types of fruit intake).
6. To create an instrument to measure the patterns of eating behavior and the utility for fruit compared to commonly competing food choices among the target population.

## CHAPTER III

### METHODS

#### Research Design

The research design for this study generally follows the structure and process established for the TPB study protocol (Ajzen & Fishbein, 1980; Ajzen & Madden, 1986). The four basic steps involved in the protocol are to: 1) define the behavior, 2) define the intention, 3) elicit salient beliefs in the target population, and 4) conduct the final questionnaire. Using this method, cross-sectional data are obtained. Each of these steps will be discussed with greater detail provided for the elicitation and final questionnaire methodology.

#### Step 1. Behavior Defined

Again, according to Ajzen (1988), in order to predict and understand intention and behavior more accurately, the behavior being studied must be specified in terms of action, target, context and time. For this study, the behavior of interest is defined for each domain – to eat (action) fruit (target) at the worksite/during the duty day (context) over the next three days (time).

As mentioned in the discussion of limitations of this method, the specificity of the defined behavioral target has significant bearing on the utility of the research results. If the target is too general, the researcher will sacrifice the predictive power of the model and fail to explain appreciable variation in the behavior. On the other hand, even if a



large degree of variance is explained, a highly specific behavioral target will fail to provide the researcher with meaningful and useful information about a general class of behavior (i.e. fruit consumption). To address this issue, the specificity of the behavioral target in this study will be modified in the elicitation step. This modification will provide the investigator with a set of common modal salient beliefs across specific food consumption behaviors (i.e. specific fruits) in addition to the modal salient beliefs for the general class of behaviors (i.e. the fruit group). Thus, the behavioral target for the elicitation step will be defined as the 'general' (and meaningful) behavioral target, fruit, and four 'specific' behavioral targets (individual fruits). The specific fruits were selected for their popularity, availability, year-round seasonality, and convenience and include apple, banana, orange, and seedless grapes.

Once the modal salient beliefs are elicited, the behavior will be redefined as the general behavioral target, fruit, in the final questionnaire. Again, this target should be specific enough to explain an appreciable amount of variance in the behavior; yet, not so highly specific as to lose meaning and utility for the practitioner.

### Step 2. Intention Defined

In accordance with the model, behavioral intention must be defined at the same level of specificity as the actual behavior. Given the primary interest in this study is in overall fruit intake rather than specific fruit intake, the intention to engage in the behavior will be defined at the same level of specificity as the general behavior. The defined behavioral intention is as follows: the intention to eat fruit at the worksite/during the duty day within the next three days.

### Step 3. Elicitation of Salient Beliefs

In general, the elicitation step involves the creation and implementation of an open-ended questionnaire. This questionnaire is designed to elicit salient behavioral, normative and control beliefs among individuals from the target study population. Once beliefs are generated at an individual level, the responses are analyzed to extract modal salient beliefs to be used in the final questionnaire.

#### Instrument Development

The elicitation survey instrument for this study was developed according to the procedures suggested by Ajzen and Fishbein (1980) and Ajzen and Madden (1986). Following the TPB and TRA, the goal of the instrument is to generate a list of beliefs regarding the advantages or disadvantages of performing the behavior, a list of important others who would approve or disapprove of one's performing the behavior, and a list of factors which might help or prevent one from performing the behavior. In this case, there were two behaviors of interest: the decision to select fruit over other food choices and the decision to choose a specific fruit over other fruit choices. Thus, a variety of open-ended questions were designed by the investigator to elicit behavioral, normative, and control beliefs for both behaviors. In order to generate salient beliefs within the context of interest in the study, the questions were also framed to place the subject in the appropriate situation and setting. These questions were reviewed by colleagues and the thesis committee and modified to improve readability and intended meaning.

Upon revision, two separate questionnaires were developed for pilot testing. Each questionnaire varied in wording and format in order to test a variety of questions and attempt to gain the most possible responses. To test wording and format, the investigator felt only one specific fruit needed to be isolated in the pilot questionnaire; therefore, the

questionnaires inquired only about the decision to select an apple over the other specific fruits.

### Pilot Test

A pilot test of the elicitation questionnaires was conducted among a sample (n=6) of subjects representative of the target population in a group setting. Subjects were students attending Airmen Leadership School, Shaw AFB, SC.

The survey was administered by the investigator using the same procedures planned for the actual elicitation questionnaire administration. The investigator introduced herself as a master's student conducting research on marketing techniques. Then, subjects were asked to complete the questionnaire by listing as many responses that they could think of for each question. The investigator reinforced the open-ended nature of the instrument by reminding the participants that there were no 'right' or 'wrong' answers (this is not a test) and that the best answers are those that come to mind when they read the question.

Upon completion, the investigator facilitated a discussion to gather information on the content, format and structure of the questionnaire. All subjects completed the questionnaire in 4-5 minutes. Then, each question was read and subjects were asked to comment on the wording. Did you feel like you understood the question? In response, one subject found the first question in the first variation of the questionnaire to be too wordy and other participants agreed the question could be simplified. The subjects indicated all other questions were readable and easy to understand. Next, each question was discussed in terms of validity. The researcher explained the meaning of each question and respondents shared their answers. In this discussion, it appeared the questions elicited the appropriate and anticipated responses. Finally, the subjects were

asked to comment on the format, structure and any other aspect of the questionnaire.

Participants commented that it was easy to read, fill out and follow. One participant felt the 'introduction,' which aimed to create the context of the study, should be changed. The participants agreed that their schedules rarely afford them a lunch or dinner hour.

Following the pilot test, the investigator tallied the responses for each variation of the questionnaire. Responses to each set of questions (favorable and unfavorable responses) except one elicited approximately 7-10 salient beliefs. The limited responses to the behavioral belief question for choosing an apple over the other specified fruits were consistent across both questionnaire variations. The investigator noted that the difference between these questions and the others was that they failed to frame the question in the contextual framework of the study. In other words, there was no mention of making this decision in the workplace or during the duty day. Changing the wording of this question to be consistent with the other questions should eliminate context as a factor. If context proves to not be a factor, participants may still not see an advantage/disadvantage to choosing one fruit over the other in the final elicitation questionnaire.

#### Final Elicitation Questionnaires

In response to the feedback of the pilot study participants and review of the completed questionnaires, the wording of the introduction, the first question in the first variation, and the behavioral beliefs question for the specific fruit in both variations was changed to create the final elicitation questionnaires. Also, the word apple was replaced by each of the other three fruits to create four different questionnaires. Given the success of the variation in question wording to elicit varied responses, both versions were also retained. Thus, for final administration, eight distinctly different questionnaires were

distributed. Examples of the variations, with the apple given as the isolated fruit choice, are provided as examples in Appendix A, 2.

### Subjects

Participants for the final questionnaire were recruited from a variety of sites at Shaw AFB, SC. Given the population of interest, 18-30 year old enlisted males, the airmen schools and squadrons were targeted. Final administration sites included Airmen Leadership School, First Term Airmen's Course, and the 77<sup>th</sup> Fighter Squadron. Each site allowed the investigator to administer the pencil/paper questionnaires in a group setting.

### Sample Size

Recommended sample sizes for the elicitation step in the TPB protocol are not stated specifically or suggested by the original researchers (Ajzen & Fishbein, 1980; Ajzen & Madden, 1986). Thus, for this study, the decision for sample size was based on examples in previously published research using similar methodology. For example, Ajzen & Madden (1986) recruited 24 college students to elicit factors related to perceived behavioral control. In another study using the TPB to investigate exercise behavior, the researcher (Kimiecik, 1992) conducted the elicitation questionnaire using 30 subjects. And, in research published using the TRA to study nutrition behavior (Saunders & Rahilly, 1990), the elicitation questionnaire was administered to 27 subjects.

Based on these examples, the investigator and thesis committee agreed to establish a sample size of thirty participants for each behavioral target defined for the elicitation step. As discussed previously, this project involves greater specificity at the elicitation phase and included four behavioral targets – apple, banana, orange, and seedless grapes. The investigator decided the best method to obtain the data would be to elicit responses for one specific fruit per subject in order to avoid errors introduced by

question exhaustion. Thus, the final sample size for the elicitation questionnaire was established at 120 subjects (n=120).

### Data Analysis

Responses to the open-ended questionnaires were pooled and analyzed for the entire sample size according to guidelines provided by Ajzen & Fishbein (1980). The first step in the data analysis was to separate the responses to the behavioral, normative and control questions. Upon doing so, the researcher found a substantial amount of overlap between behavioral and control belief responses; therefore, the decision was made to tally and analyze the responses to these questions together and designate the type of belief in a later step.

Normative beliefs. Once this determination was made, the researcher began data analysis by extracting and tallying normative beliefs. A list of salient referents was compiled from the questionnaires as each significant other was mentioned. Once the list was exhausted, a tally mark was made each time the referent was mentioned by a respondent to determine the most frequently mentioned individuals or groups. Responses to the normative belief questions were relatively straightforward; therefore, the researcher used minimal subjective analysis in the interpretation of the responses. Some responses were grouped logically to consolidate the data. For example, all responses referring to a spouse, girlfriend, or fiancée were grouped together given the similar function and exclusivity this referent would serve in the individual's life.

After a complete list and tally was made, the referents were ranked in descending order according to response frequency. The set of modal salient normative beliefs were determined using a combination of methods provided by Ajzen & Fishbein (1980). They suggest three distinct methods: 1) take the 10 to 12 most frequently mentioned responses,

2) select those mentioned by at least 10% or 20% of the sample or 3) choose as many responses as necessary to account for a certain percentage, typically 75%, of all responses emitted. The results were evaluated based on each of these criteria and compared to results found in previous literature. Using input from this analysis, the researcher made a subjective decision on the referents that would be included in the final modal salient set used to construct the final questionnaire.

Behavioral and control beliefs. An analysis of the behavioral and control beliefs was more involved than that of the normative beliefs. Given the unique method of elicitation, the data included responses on two levels of specificity, general and specific, and on two belief dimensions, perceived control and outcomes. Thus, a four-way analysis was necessary (see Figure 3).

	General Behavioral Target (Fruit versus Other Foods)	Specific Behavioral Targets (Fruit versus Other Fruits)
Behavioral Beliefs	Behavioral Beliefs for Fruit versus Other Foods	Behavioral Beliefs for Fruit versus Other Fruits
Control Beliefs	Control Beliefs for Fruit versus Other Foods	Control Beliefs for Fruit versus Other Fruits

Figure 3. Four-way analysis of elicitation questionnaire responses.

First, the investigator divided the responses to the questions designed to elicit salient beliefs for the general behavioral target (fruit vs. other foods) and the responses to the questions designed to elicit salient beliefs for the specific behavioral target (fruit vs. other fruits). The analysis for each of these response categories was conducted on separate occasions.

Fruit versus other foods. Each participant in the survey population (n=119) responded to questions eliciting control and behavioral beliefs for the general behavioral target. For data analysis, a systematic approach was used and the steps were as follows:

- 1) Each individual response to each question was written on a separate Post-it note.
- 2) Identical responses were grouped together and tallied; one Post-it note was retained with the frequency of the identical response noted.
- 3) Similar responses were evaluated by the investigator for meaning or intended meaning and grouped accordingly. Similarity was determined by asking whether the outcome in question could have been reasonably emitted by the same person or if the outcome could be categorized under one belief. If the answer was 'yes,' the item was included in the belief category. If the answer was 'no,' the item was evaluated for similarity and matched to another belief category or a new belief category was established.
- 4) Once all responses were evaluated, those that fell under a similar belief category were summarized by selecting one word or phrase that best described the response group. When possible, the word or phrase selected was derived from the most commonly used terminology in the sample population.
- 5) The remaining individual responses were retained and reevaluated to ensure all response themes were captured.
- 6) The number of responses in each belief category was tallied to provide frequency data.



- 7) The final list of response categories was evaluated to determine the appropriate type of belief designation. Thus, the list was divided into two groups: outcome-based beliefs and control-based beliefs.
- 8) Finally, categories in each list were ranked in descending order based on the frequency of responses.

Upon completion of this process, the investigator reviewed the lists of beliefs and questioned the possible similarity between several belief categories that would affect the frequency and ranking of the belief sets. To clarify this uncertainty, the researcher designed a questionnaire for a sample of the study population to indicate whether the belief categories were similar or different (Appendix A, 3). Categories that were determined to be similar were combined and assigned the title of the more frequently mentioned category while ensuring this title captured the meaning of both categories. Belief sets that were determined to be different were retained and ranked according to their original frequencies.

To determine the belief sets that would make up the modal salient beliefs, the researcher repeated the analysis used in the selection of the normative modal salient beliefs for both the control-based beliefs and the outcome-based beliefs.

*Fruit versus other fruits.* Each participant in the study population (n=119) also responded to questions eliciting control and behavioral beliefs for the specific behavioral target. The only difference was whether the participant was designated the choice of an apple (n=30), orange (n=30), banana (n=30), or seedless grapes (n=29), in contrast to the remaining fruits not chosen. Yet, for the purpose of data analysis, responses elicited on each separate fruit were pooled to determine the common salient beliefs across all fruits.

Therefore, the process denoted for analyzing responses to the general behavioral target was repeated for analyzing the pooled responses to the specific behavioral targets.

#### Step 4. Conduct Final Questionnaire

The final step in the TPB protocol involves the development, administration and analysis of the final questionnaire. Yet, for the purpose of this research, the project will include only the development and testing of the final questionnaire.

#### Questionnaire Development

The final questionnaire was developed to test constructs within the TPB to include attitude, social influence, perceived control, and behavioral intention according to guidelines provided by Ajzen & Fishbein (1980) and a similar questionnaire designed and tested by Saunders (1986). In addition, measures were included to investigate patterns of food selection behavior and the utility or importance of fruit in the target population.

Measurement of attitude. Results of the data obtained from the elicitation step were used to construct the attitude measurement scale. Modal salient outcome beliefs for the general behavioral target (fruit versus other foods) and the specific behavioral target (fruit versus other fruits) were compared. Any identical or similar items were combined to be represented as a single item on the final scale. The remaining items unique to the specificity of the behavioral target were also included.

Items were worded to indicate the appropriate action, target, context and time. The strength of each belief item was measured using a 7-point scale with endpoints ranging from 'very likely' to 'very unlikely.' The corresponding evaluation of each belief was measured using a 7-point scale with endpoints of 'very good' and 'very bad.'

Measurement of subjective norm. Data obtained from the elicitation step were used to construct the scale to measure social influence. Important others, determined based on the frequency data and grouped into categories, were included as separate items on the scale. Based on this information, items were constructed to measure normative beliefs and were worded “\_\_\_\_\_ think(s) I should eat fruit for snacks or as a part of meals during my duty day in the next three days.” This statement was rated on a 7-point scale with endpoints of ‘very likely’ to ‘very unlikely.’ The corresponding measure of motivation to comply with each referent was also measured on a 7-point scale, but with a range from ‘very much’ to ‘not at all.’

Measurement of perceived control. Results of the data obtained from the elicitation step were also used to construct the measurement of perceived behavioral control. Modal salient control beliefs for the general behavioral target (fruit versus other foods) and the specific behavioral target (fruit versus other fruits) were compared. As was done for the outcome beliefs, any identical or similar items were combined to be represented as a single item on the final scale. The remaining items unique to the specificity of the behavioral target were also included.

Items were carefully worded to indicate the appropriate action, target, context and time. Because of the nature of the control beliefs elicited from the population, several considerations were involved in the creation of the scale. Several modal responses dealt specifically with issues of availability: availability of fruit in general, availability of other foods, and availability of fruits that the person liked or was in the mood for. Thus, the researcher felt these items should be measured first. Then, based on the contingency that the fruit liked or preferred by the individual was available, the remaining control beliefs concerning feasibility were measured. Both sets of items were measured using a 7-point

scale with endpoints ranging from 'very likely' to 'very unlikely.' The corresponding evaluation of the power of each control belief was measured using a 7-point scale with endpoints of 'very easy' to 'very difficult.'

Measurement of intention. A single item was developed to measure intention. The item was carefully constructed to parallel each other construct in terms of context, target, action, and time. Respondents are asked to indicate their intention to perform the behavior on a 7-point scale depending on how much they 'strongly agree' or 'strongly disagree' with the statement, "I intend to eat fruit as a snack or as part of a meal during my duty day over the next three days."

Measurement of patterns of eating behavior. An item of interest in the population that cannot be captured by the constructs included in the TPB is the pattern of eating behavior at the worksite among the population of interest. Per conversation with a committee member experienced in marketing research (Madden, T. J., personal communication, November 22, 1999), one method to obtain this information is a measure used to assess switching behavior. Participants are asked to indicate the items on a list that they used in a period in the past. Then, the participants are asked to indicate which items on a list they intend to use in a period in the future. From this information, the researcher is able to ascertain whether individuals switch products or brands or if their selection behavior is consistent over time. This data would indicate the position of fruit selection behavior in the context of overall food selection behavior over time.

To create this measure for this study, the researcher brainstormed a list of foods considered appropriate or available alternatives to fruit for meals or snacks among the population of interest from observation and experience. Given this list, respondents were asked to indicate which foods from the list they consumed as a part of meals in the past

three days. Then, given an identical list, respondents were asked which foods they intend to consume as a part of meals in the next three days. A three-day period was used to coincide with the 'time' aspect of the behavior measured with the TPB and based on the relative reliability of this recall period in nutrition research. This measure was then repeated to measure patterns of snacking behavior by asking the respondents to indicate the foods have eaten (and intend to eat) between meals. The same time period and food list was provided.

Measurement of utility of fruit. The scale included to measure the utility of fruit was selected under the guidance of Madden (personal communication, November 22, 1999) and designed according to an example presented by Dillon, Madden and Firtle (1987). This instrument, a constant sum scale with paired comparisons, includes a sequence of paired items. Instructions are provided to guide the respondent to assign 11 points or tokens between the two items according to their preference. Items included in the scale were selected by the researcher based on observation of common food choices among the target population.

Two separate scales were designed to measure the utility of fruit; one to measure the utility in a meal setting and one to measure utility in a between-meal or snacking environment. For meal settings, the researcher selected foods commonly competing for dessert: cake/pie, cookie, frozen dessert (ice cream, frozen yogurt), and fruit. An effort was made to limit the number of foods in the instrument to avoid question exhaustion and the potential for intransitivity. Given there were four items for comparison in this scale, the scale was limited to six paired comparisons. For between-meal or snacking environments, a wider range of foods was selected while still aiming to limit the length of

the scale. Items selecting included candy, cereal bar/granola bar, chips, and fruit. Again, these four items yielded six paired comparisons.

Demographic data. Extent of demographic data requested was limited to information of relevance to the results. Although the study is limited to males age 18-30 the researcher requested specific ages to allow analysis of differences between specific age groups. Rank may provide insight to differences in working environment and perceived control issues. Armed forces specialty code (AFSC) indicates the individual's job specialty while duty location will indicate the individual's working environment and organizational structure. Both pieces of information would allow further analysis to gain insight to potential differences in factors affecting fruit consumption based on features of the worksite. Finally, an item was included to assess marital status in order to gain insight into the potential effect of social support.

Questionnaire organization and layout. The researcher sequenced the construct measures within the instrument carefully to minimize bias in the responses. Specifically, the overall food selection pattern and utility measures were presented first followed by the narrowed food selection behavior of fruit consumption. Demographic data was requested last to avoid creating a barrier to response based on the concern of anonymity prior to knowing the content of the instrument.

### Pilot Test

Following the initial construction of the final questionnaire, the measurement instrument was tested for readability, response format clarity and comprehension, time for completion and overall respondent feedback. Tests were conducted among an expert panel and a sample of the target population.

Expert panel. The expert panel consisted of students enrolled in an advanced measurement course offered by the School of Public Health, University of South Carolina (n = 10) and a member of the researcher's thesis committee. The researcher administered the instrument informing the panel of the purpose of the study and the intended audience for the final questionnaire. Participants were asked to note the time required to complete the questionnaire and any content or structural aspects of the instrument that were unclear or needed improvement. All panel members were able to complete the questionnaire in 15-20 minutes. Then, suggestions were provided to the researcher in a discussion forum and the completed questionnaires were retained by the researcher to evaluate any additional input.

Numerous improvements were made to the final questionnaire based on the panel's evaluation and feedback. Overall, the panel participants agreed that the layout of the instrument was appealing to the eye and relatively easy to follow. Specific suggestions were made to rearrange the scales measuring food selection patterns and utility of fruit to avoid flip-flopping between questions regarding meals and snacks and references to past and future behavior. As a result, questions were combined and arranged to focus on behavior related to meals followed by behavior related to snacks. The panel also felt that the heading for each section may be too technical for the 'layperson' and the entire questionnaire should be preceded by a title and introduction or cover sheet. Thus, each of the elements were changed to make the instrument more 'user-friendly.'

In terms of content, the panel generated more concerns and questions. First, the entire panel agreed that the lists of foods in the first two sections were unnaturally biased toward 'junk' food and that it seemed obvious that the item that did not fit was fruit. One suggestion was to add vegetables to the list either as an actual item or as a decoy. Thus, in

the list of foods measuring switching behavior, vegetables were added. Vegetables were also added to the items in the paired comparison measuring the utility of fruit among foods selected for snacks. In the instrument measuring utility of fruit among foods traditionally selected for dessert, on the other hand, the researcher felt there were few healthy alternatives to fruit that would realistically compete in this setting. Thus, the original scale items were retained.

Another content problem identified in the first section was the designation of items in one category of foods. In an attempt to capture a wide variety of foods in a manageable list, the researcher grouped nuts and pretzels under the heading of chips. The panel felt these items were too dissimilar and pretzels and nuts were made into their own category.

Two final content issues arose in the sections measuring the construct of the TPB. First, one behavioral belief was negatively worded making it difficult to translate and generate a reliable response. Thus, the phrase 'not be filling enough' was changed to 'will leave me hungry' without losing the original meaning of the behavioral category. Then, panel members indicated they had difficulty with the wording of the qualifying phrase in the control beliefs section. The decision was made to change the wording to make the items more readable.

The panel also questioned the wording of the instructions in a few sections. For the constant sum paired comparisons, the panel members were unsure whether the term 'prefer' meant that they should indicate the food they would select or the food they should select. A suggestions was made to change to wording to 'the food you would choose' rather than 'the food you would prefer.' The researcher determined that the suggested wording did improve the intended meaning of the question. Another question



regarding wording arose in the section measuring the strength of social influence. The panel indicated that their responses may differ if the question was put in the context of food selection behavior rather than behavior in general. The researcher changed the wording of the question for the second pilot version and planned to defer this discussion to the thesis committee members for guidance.

Another concern raised by one panel member was the applicability of the concept of a distinct mealtime in the target population. The researcher felt this concern may be justified in the target population but retained the distinction until the instrument was piloted in this group. If the issue does not immediately surface in the pilot test, the researcher will address it specifically to insure this is not a concern.

Target population. Following changes in the final questionnaire based on input from the expert panel, the researcher administered the questionnaire in a sample of the target population (n=22). Participants were all class members attending a course at the Airmen Leadership School, Shaw AFB, SC. The researcher administered the instrument informing the panel of the purpose of the study and the purpose of their participation. Participants were asked to note the time required to complete the questionnaire and any content or structural aspects of the instrument that were unclear or needed improvement. All class members were able to complete the questionnaire in 15 minutes or less. Then, the researcher led a discussion to obtain feedback and suggestions; completed questionnaires were retained by the researcher to evaluate any additional input.

First, the researcher asked the class about their overall impression of the questionnaire regarding the degree of difficulty, length, and organization. In response, the class overwhelmingly agreed that the instrument was easy to follow and a reasonable length. Then, the researcher asked the participants to go through the survey page by page

and offer any specific comments. Participants felt the first two sections measuring the patterns of eating behavior and utility of foods for meals and snacks were very easy to follow. They stated that the directions were clear and that they had no trouble understanding the content or what they were supposed to do. Because the researcher was concerned about the potential difficulty of the constant sum scale, she probed further to ensure participants did not find this activity too challenging. The group responded that this section was one of the easiest parts and actually thought it was fun to assign the numbers. The researcher later verified their reply by checking their responses on the questionnaire and found the numbers were assigned correctly and consistently summed to 11 points.

Recalling a concern brought up by the expert panel, the researcher was interested in the respondents' interpretation of the questions regarding the distinction of a specific meal. While reviewing to this section, the respondents did not indicate that they felt a distinct meal was not applicable in their work environment. The researcher specifically addressed this issue and the class members felt that their 'meals' may not fit the traditional definition but that they could recall a time or group of foods that they considered breakfast, lunch or dinner. In other words, they did not have any trouble interpreting these questions or answering them according to their intended meaning.

In the remaining sections measuring the constructs of the TPB, the class members did offer comments on several items. In the scale evaluating the outcomes, the participants were confused about the context of some of the statements. They felt 'being expensive,' 'being messy,' and 'being time consuming' should have been qualified in the context of eating. Respondents indicated that they made this assumption but they were not sure if that was correct. Thus, these items were reworded to begin with 'having/eating

a food that is...is.' One member of the class also felt there was an inconsistency in the directions on this section. Unlike the other sections, there was not a statement preceding the items. As a result, an introductory phrase was added.

In the following section measuring the influence of significant others, the members had a couple comments. Several stated that some of the referents did not apply to them so they did not know what to do. Given this comment, the researcher decided to bold face the statement in the instructions to 'leave an item blank if it does not apply.' In the motivation to comply section, one respondent interpreted the statement preceding the scale to infer that he was selecting or preparing food for other people. As a result, the investigator changed the wording to ensure the intended meaning was clear.

In the final section and the questions requesting demographic data, the respondents did not have any suggestions and felt the questions were relatively straightforward and easy to understand.

After the members' verbal comments were taken into consideration and incorporated into improvements in the final questionnaire, the researcher reviewed the completed questionnaires. Each item and response was read to determine whether the respondent seemed to understand the instructions and the intended meaning of the item. For example, if several respondents rated a generally accepted positive value as negative, the wording of the question may need to be adjusted. This review did not reveal any consistently misguided questions; therefore, the researcher maintained the structure and wording of the final questionnaire as it had been revised (Appendix A, 4).

## CHAPTER IV

### RESULTS

#### Description of Subjects

The subjects completing the elicitation questionnaire were 119 active duty Air Force males between the ages of 18 and 30 years old. Participants included students enrolled in the First Term Airmen's Course and Airmen Leadership School. Questionnaires distributed to the 77<sup>th</sup> Fighter Squadron were not returned to the researcher; thus, additional participants were recruited from the two school sites.

Although demographic data was not collected in the elicitation step, some general assumptions may be made about the distribution of subjects based on the sampling method and the nature of these courses.

The researcher administered the questionnaire on seven separate occasions from July to November 1999. Dates, times and classes were randomly selected based on convenience for the researcher and the course instructors. Although the questionnaire was presented as voluntary, every member of each class participated.

The First Term Airmen's course includes all new enlistees entering Shaw AFB and the Airmen Leadership School is also a course required for all Air Force enlistees at a later rank. Thus, this population is representative of the young Air Force enlisted population in terms of race, education level, job specialty, and worksite environment.

Yet, given the established rank requirements of these courses, the variable of 'years of service' would be skewed. Participants in the study either had less than one year in the military or more than three. Members serving 1-3 years were underrepresented.

### Modal Salient Beliefs

#### Normative Beliefs

A list of referents and the corresponding frequency of response obtained from the elicitation questionnaire is provided in Table 1. The response "no-one" was tallied when a respondent literally stated that no one influenced his decision to eat fruit either positively or negatively. This item was included in the analysis due to the frequency it was mentioned and to retain this data for comparison in future analysis of the main survey.

Twenty-four separate referents and the response 'no-one' were mentioned by the subjects with a range of frequency from 1 to 48 times. Seven modal salient referents were selected for inclusion in the final questionnaire based on frequency of response using methods described by Ajzen and Fishbein (1980) and expert judgment by the investigator based on familiarity with the target population. Based on the selection methods suggested by Ajzen and Fishbein (1980), the modal salient referents to be included in the final set ranged from the first six to the first twelve. The researcher used these guidelines and observed the data. Using the first twelve would include all referents mentioned by at least two respondents, meaning that referents would be included in the modal set that were not relevant given a population of 119. Taking the first six, excluding the category of 'no one,' appeared to be at a natural break in the response frequency. Yet, upon further

observation, the investigator felt the seventh referent, children, should also be included.

Children may be a significant referent for those with children but may have appeared low in the frequency data given the small number of respondents that had children. Thus, the first seven referents were selected for the modal set and are indicated in Table 1; they include wife/girlfriend/fiancée, friends, coworkers, parents, supervisor, doctor, and children.

Table 1

Results of elicitation questionnaire – normative beliefs

Referent	Frequency
“No-one”	48
Wife/Girlfriend/Fiancee*	30
Friend/s*	29
Co-worker*	27
Parent*	23
Supervisor*	21
Doctor*	21
Children*	9
Person who stocks unit snack bar	6
Self	5
Grandparents	4
Brother or Sister	4
1 <sup>st</sup> Sergeant	2
Dentist	2

Other: Physical Therapist, Teacher/Instructor, Commander, Officer, 1 each  
 Flight Chief, Overweight people, Male models, Insurance company,  
 Workout partner, 'someone' eating fruit, sibling

---

\* Referent included in the modal salient set

## Behavioral Beliefs and Control Beliefs

Again, as was described in the methodology of this study, a four-way analysis was conducted on the data elicited at two levels of specificity for the behavioral target, a general behavior and four specific behaviors, and two categories of beliefs, behavioral beliefs and control beliefs. The results of each analysis are presented separately here beginning with behavioral beliefs for the general behavioral target, fruit intake.

Behavioral beliefs for the general behavioral target. When respondents were asked to indicate the advantages/disadvantages or the good/bad things that may happen as a result of eating fruit during their duty day, their responses clustered into thirty-two separate categories (Table 2). Frequency of response in each category ranged from 1 to 73. Nine modal salient beliefs were selected for inclusion in the final questionnaire

Table 2

Results of elicitation questionnaire – behavioral beliefs for general behavioral category

Behavioral Belief	Frequency
Benefit my health*	73
Give me energy*	38
Taste good*	26

---

Not be filling enough*	18
Be expensive*	18
Be messy*	16
Make me feel better about myself for eating healthy*	13
Provide necessary vitamins*	16
Be time consuming*	13
Provide less calories	10
Provide less fat	10
Help me lose weight	9
Make my diet more nutritious	7
Make me feel healthier/better	6
Help me control my weight	5
Give me an irritated stomach	5
Add variety/balance to my diet	4
Fail to satisfy my craving for sweets	4
Result in me getting sick less often	3
Make my diet higher in fiber	3
Increase my fluid intake	2
Make me feel refreshed	2
Provide a natural source of sugar	2
It would...strengthen my teeth, make me less likely to eat sweets, give me better skin, give my good breath, make me live longer, look good on my desk, be all-natural/no preservatives, lower my cholesterol	1 each

---

\*Behavioral belief included in the modal salient set



based on frequency of response using methods described by Ajzen and Fishbein (1980) and expert judgment by the investigator based on familiarity with the target population.

Based on the selection methods suggested by Ajzen and Fishbein (1980), the modal salient beliefs to be included in the final set ranged from the first nine to the first twelve. The first nine belief categories met two criteria outlined by Ajzen and Fishbein (1980); they represent both 75% of all responses elicited and 20% of the population elicited. A second review of the response sets excluded by selecting the first nine indicated each of these sets referred to fat/calorie content of fruit and weight control issues. Results of the same/different analysis conducted in this population indicated each of these responses were different enough to maintain a separate belief categories. As separate categories, these responses accounted for less than 10% of the population elicited and determined to be excluded from the modal set. The nine modal salient behavioral beliefs for the general behavioral target are indicated in Table 2.

Control beliefs for the general behavioral target. When respondents were asked to indicate what would make it easy/difficult or more/less likely that they would choose fruit during their duty day, their responses clustered into twenty-three separate categories (Table 3). Frequency of response in each category ranged from 1 to 65. Seven modal salient beliefs were selected for inclusion in the final questionnaire using the same method described for the normative and behavioral beliefs.

Ajzen and Fishbein's (1988) selection methods suggest the modal salient beliefs to be included in the final set would range from the first seven to the first twelve. The investigator determined that each response category after the first seven represented less than 10% of the population elicited with the twelfth representing less than 5% of the population elicited. Thus, the first nine control beliefs elicited on the general behavioral

target were included in the modal salient set and are indicated in Table 3.

Table 3

Results of elicitation questionnaire – control beliefs for general behavioral category

Control Beliefs	Frequency
Fruit was available/accessible*	65
Fruit was convenient*	45
The fruit available was in good condition/looked good (ripeness, freshness)*	33
It was a specific type of fruit*	22
Fruit was less time consuming/If I had the time*	19
I was in the mood/had a craving for fruit*	18
Other snacks were available*	16
I brought fruit to work with me	11
Had an appropriate place to store fruit (i.e. refrigerator)	10
I could carry fruit around with me during the day	6
If there was a variety of fruit to choose from	6
The there was no waste to clean up	5
The fruit required no preparation	5
The fruit was easy to eat	4
I knew that it was better for me	4
Saw someone else eating fruit	3
There was a sink to wash my hands, I was not thirsty, The same fruit was available all the time, I lack self-control, Fruit did not spoil so easily, There was a place to wash fruit, I went home for lunch	1 each

\* Control belief included in the modal salient set

Behavioral beliefs for the specific behavioral targets. When respondents were asked to indicate the advantages/disadvantages or the good/bad things that may happen as a result of eating a specific fruit as opposed to another group of fruits during their duty day, their responses were more varied. Yet, in analysis, the investigator pooled the responses across all fruits into categories and found there were fewer categories than were elicited for fruit alone. Specifically, the responses grouped into fifteen separate categories (Table 4). Frequency of response in each category ranged from 1 to 41, indicating participants also provided less overall responses to these questions. In this analysis, six modal salient beliefs were selected for inclusion in the final questionnaire based on frequency of response using methods described by Ajzen and Fishbein (1988).

Table 4

Results of elicitation questionnaire – behavioral beliefs for specific behavioral targets

Behavioral Belief	Frequency
Be messy to eat*	41
Taste good *	34
Provide necessary vitamins *	23
Benefit my health*	14
Be expensive*	13
Be time consuming*	13
Be easy to control the serving sizes	9
Not be filling enough	6
Make my diet high in fiber	3

Be fun to eat	3
Be refreshing	2
Provide a natural source of energy	2
It would...give me heartburn, make too much noise, keep my teeth clean	1 each

---

\* Behavioral belief included in the modal salient set

Based on the selection methods suggested by Ajzen and Fishbein (1988), the modal salient beliefs to be included in the final set ranged from the first six to the first twelve. The first six belief categories met two criteria outlined by Ajzen and Fishbein (1988); they represent both 75% of all responses elicited and more than 10% of the population elicited. Inspection of the six remaining salient beliefs sets showed each of these responses accounted for less than 7% of the population elicited. Thus, the top nine salient behavioral beliefs were retained to make up the modal set for the specific behavioral target and are indicated in Table 4.

Control beliefs for the specific behavioral targets. Then, when respondents were asked to indicate what would make it easy/difficult or more/less likely that they would choose a specific fruit from a list of fruits during their duty day, their responses were again more varied than those provided for the general behavior of eating fruit. Yet, the responses also clustered into a smaller number of categories than for that of the general behavioral target. In this case, fourteen separate categories were found (Table 5). Frequency of response in each category ranged from 1 to 66 indicating these questions elicited a similar range of responses as the same question did for the general behavioral category. Ten modal salient beliefs were selected for inclusion in the final questionnaire

using the same method described for the previous beliefs.

Table 5

Results of elicitation questionnaire – control beliefs for specific behaviors

Control Beliefs	Frequency
It required effort to eat (have to peel, segment, core, deal with seeds, wash)*	66
I liked the fruit that was available*	39
The fruit available was in good condition/looked good (ripeness, freshness)*	30
The fruit was more durable/less perishable*	20
There was a variety of fruit to choose from*	16
There was a mess that had to be cleaned up*	13
It was transportable/I could carry it with me*	13
Fruit was available/accessible*	13
Had an appropriate place to store fruit (i.e. refrigerator)*	13
Fruit that I like was convenient (i.e. in vending machine or at snack bar)*	12
I was in the mood for the fruit that was available	11
There was only fruit to choose from	5
The fruit was the right texture (crunch, juicy, smooth, firm, etc.)	5
I wanted variety in my diet	1

\* Control belief included in the modal salient set

Ajzen and Fishbein's (1980) selection methods suggest the modal salient beliefs to be included in the final set from this group of responses would range from the first nine to the first twelve. The first ten response categories met two of the criteria set forth

by Ajzen and Fishbein; they represent 75% of all responses elicited and were emitted by more than 10% of the respondents. Thus, the first ten control beliefs elicited on the specific behavioral targets were included in the modal salient set and are indicated in Table 5.

### Comparison of Modal Salient Beliefs

#### Behavioral Beliefs

A comparison of the modal salient beliefs elicited for the general behavioral category, eating fruit, and the specific behaviors, eating an apple, an orange, a banana, or seedless grapes showed few differences. As mentioned previously, eliciting behavioral beliefs at a higher level of specificity yielded fewer overall responses and fewer belief categories. The content of the beliefs elicited at the more specific level were similar to that elicited at the general level. The response categories included in the salient set for the specific behavioral target were all represented in the salient set for the general behavioral target. In fact, elicitation at the general level yielded three more modal salient beliefs that would not have been captured at the specific level: 'give me energy', 'not be filling enough,' and 'make me feel better about myself for eating healthy.' The only other difference noted was the differing order of the responses included in each set based on slight differences in response frequencies.

In other words, participant's salient beliefs regarding the advantages or disadvantages to choosing fruit over other types of foods were similar to their salient beliefs regarding advantages or disadvantages to choosing a particular type of fruit compared to other types of fruit. For behavioral beliefs associated with fruit consumption, nothing was gained by eliciting at a more specific behavioral level.

## Control Beliefs

A comparison of the control beliefs elicited at the same two levels of specificity showed much different results. Again, the number of response categories elicited was much fewer at the specific level than at the general level and the content of the responses were similar. But, in this case, the responses at the two levels of specificity differed in frequency making the modal salient sets different. Specifically, six control belief categories included in the modal salient set at the specific behavioral level were represented on the general control belief list; but, these beliefs were not at a frequency that included them in the modal salient set. In other words, some control beliefs 'rose' in saliency to a significant level when elicited at the more specific behavioral target. These beliefs were: 'it required little effort to eat,' 'it was more durable/less perishable,' 'there was a variety to choose from,' 'it was easy to clean up,' 'it was transportable,' and 'had an appropriate place to store.' Three belief categories ('the fruit available was in good condition/looked good,' 'fruit was available/accessible,' and 'it was a specific type of fruit/fruit I liked') were represented in both modal salient sets while yet another two ('fruit I liked was convenient' and 'I was in the mood for the fruit available') were significantly less salient at the specific level. These two control beliefs would have been dropped from the modal salient set if elicitation was conducted only at the specific level.

In summary, significant information was gained from eliciting control beliefs at both levels of the behavioral target. Six additional modal salient beliefs surfaced which help explain more of the potential barriers or facilitators to fruit consumption among the population of interest. Also of importance to note from these findings is the need to elicit at both levels. As saliency of some beliefs increase, the relative frequency of other beliefs decreases. Thus, important beliefs identified at the general behavioral level were 'lost'

when elicited at the specific level.

### Final Questionnaire

Modal salient responses at both levels of elicitation were combined to compile items to be included in the final questionnaire designed to measure each of the constructs included in the TPB along with food selection patterns and the utility of fruit in the target population. Following two revisions based on pilot studies in both an expert panel and a sample of the target population, the final questionnaire was completed (Appendix A, 4). Further details of the design of this instrument are discussed in the methodology section of this study.



## CHAPTER V

### DISCUSSION

#### Elicitation Process

The first steps in the development of the instrument to measure factors associated with fruit consumption among active duty Air Force males included the design, administration, and analysis of the elicitation questionnaire. Each of these steps will be discussed in terms of their relative contribution to the strengths and weaknesses of this study.

#### Elicitation Questionnaire Design

The hallmark of this study lies in the unique design of the elicitation questionnaire. This study is the first to attempt to overcome the serious limitation of the TPB to adequately explain a general class of behavior. To overcome this limitation, the researcher created a survey to elicit beliefs at two levels of specificity, the general behavioral level (the selection of fruit versus other foods) and the specific behavioral level (the selection of an apple, orange, banana, or seedless grapes versus the remaining alternatives). This design allowed the researcher to explore the possibility that the saliency of beliefs related to a general behavior may change if the beliefs are elicited for the same behavior but at a more specific level. Specifically, the salient beliefs elicited for the general behavior of eating a piece of fruit as opposed to another food may differ from the salient beliefs elicited for the specific behavior of consuming an apple as opposed to

an orange, banana, or seedless grapes.

The process used to create this unique questionnaire design was adapted from the procedures and examples set forth by Ajzen and Fishbein (1980) and supported in other studies on health behaviors (Schifter & Ajzen, 1985; Ajzen & Madden, 1986; Madden, Ellen & Ajzen, 1992; Godin & Kok, 1996; Nguyen, Otis, & Potvin, 1996). Specifically, the questions were written to adhere to the guideline of maintaining consistency in action, target, context, and time. The only deviation from this protocol was the variation in specificity of the behavioral target to test differences in levels of this variable on the outcome of modal salient beliefs. The questionnaire was also pilot tested in the target population to ensure readability and clarity of content.

The only weakness that may have entered the questionnaire design process was the relatively arbitrary selection of fruits used in the specific behavioral target items. The researcher consulted with the thesis committee chair and later with the remaining members of the thesis committee to decide on the four specific fruits. Factors used for the basis of this decision were year-round availability, relative convenience and familiarity. Yet, there was no empirical evidence or justification used to support this selection.

#### Elicitation Questionnaire Administration

Another strength of the elicitation process was the selection and recruitment of subjects. Subjects were students attending two schools mandatory for every member of the enlisted force at specific times in their career. Thus, the sample population was representative of the Air Force enlisted population of interest in this study in terms of age, education level, job specialty, and work environment. The only variable potentially underrepresented is the years of military service completed by the member. The schools chosen are attended within the first year of military service and after approximately 3-4

years of military service. This was not considered to pose a significant impact on the results, as attitudes among individuals with 1-3 years of military service are not likely to be significantly different than attitudes among individuals with less than one or more than three years of military service.

Although the questionnaire was administered at different sites and on different occasions, the researcher strived to overcome the potential for varying results by following a strict administration protocol. Changes in instructions were only made as the researcher discovered weaknesses in participants' responses to some questions. One potential weakness in the administration of the questionnaires was recognized early in the process and measures were taken to overcome its effects. The setting or situation the participants are in at the time the survey is completed could potentially affect the saliency of their beliefs related to the behavior in question. Thus, the researcher made an effort to ensure the instrument would not be administered in the context of a 'health survey' or in conjunction with a guest lecturer associated with the medical field. Despite this effort, the researcher also felt the student's brief removal from their usual duty location may effect the saliency of their beliefs. Thus, every effort was made to survey them early in their course enrollment and to ensure the context of the behavior was emphasized in the survey instructions.

#### Elicitation Questionnaire Analysis

Given the qualitative nature of the data, the researcher made an effort to create a systematic and methodical process for data analysis. When possible, literal interpretations of responses were maintained and frequency of responses guided the selection of modal salient beliefs to be included in the final questionnaire.

Despite this effort, some evidence suggests the researcher may have developed a

preconceived pattern for response categories between the analysis of the behavioral and control beliefs for the general category responses and the beliefs for the specific category responses. Indications of this potential bias are evident in the reduced number of belief categories between the general behavioral target, analyzed first, and the specific behavioral target, analyzed last. This suggests the researcher may have 'sought out' similar response sets. Although this error in analysis may have occurred, it should not have affected the frequency of responses in each belief category significantly. Even if affected, the results should have been biased toward greater similarity to the general behavioral target belief categories based on exposure rather than in direction of creating differences that were not there. Given that differences were the main outcome of interest in this study, the tendency of this bias to enter the analysis should not produce findings that were not present in the outcome data. The opposite may have occurred; differences may have been present that were not detected.

## Elicitation Questionnaire Results

### Modal Salient Beliefs

Normative beliefs. Normative beliefs were only elicited at the general level of the behavioral target given the unlikelihood that any differences would exist depending on the degree of target specificity. Results of the elicitation questionnaire indicated seven referents or referent groups made up the modal salient set. These referents included wife/girlfriend/fiancée, friends, coworkers, parents, supervisor, and children.

The literature suggests salient referents vary some depending on the behavior of interest but vary more depending on the social setting of the population of interest. For

example, the list representing normative beliefs in this population is identical to a list of referents elicited among a group of working adults with regard to exercise behavior (Saunders, 1986). While another young adult population attending college indicated another group of referents with regard to eating at a fast food restaurant. The list of significant others representing the normative beliefs in this population were limited to parents, friends, and boyfriend or girlfriend. The modal set of referents identified in this study appears to be inclusive of the individuals represented in the social support network of the target population.

Behavioral and control beliefs. Behavioral and control beliefs were elicited at both levels of specificity; therefore, a comparison is made between the resulting modal salient beliefs at each level. As was mentioned in the presentation of results and discussion of the data analysis, the resulting lists of behavioral and control belief categories elicited at the specific level were less diverse than the beliefs elicited at the general level. Dismissing the possibility that this was a result of bias in the interpretation of the responses, one explanation of this difference may be that an individual would recall a greater number of differences when comparing a general category of behavior (fruit intake) with another general category of behavior (intake of other foods) than they would if simply comparing two items from the general category (specific types of fruit).

For the behavioral beliefs, another significant conclusion gained from the comparison of results between the general and specific behavior was that the modal salient beliefs elicited at the specific level were all represented on the list of modal salient beliefs elicited at the general level. In other words, additional information was not gained by eliciting at the more specific behavioral target for behavioral beliefs. The researcher did find the actual responses were more specific. For example, the respondent named the

specific nutrient that was gained by eating an orange instead of a banana rather than just mentioning the nutritional value of fruit as opposed to other foods. Yet, these specific responses fell into similar belief sets in the final analysis.

Some explanations are speculated for the failure of elicitation at the specific level of the behavior to yield differing results. First, as with any qualitative analysis, there is the possibility of bias on the part of the investigator to seek similar response categories when the analysis of the data set follows the analysis of the comparison data set. Secondly, respondents' salient beliefs regarding the advantages and disadvantages of fruit consumption may simply not differ significantly across varying levels of specificity. Changing the object of interest to an apple, for example, may not create a salient behavioral belief that was not already there for fruit.

Despite the failure of varying levels of specificity to identify additional salient behavioral beliefs, six modal salient beliefs were identified at both levels of specificity while three additional salient beliefs were identified at the general categorical level. Thus, nine modal salient beliefs were identified to include in the final questionnaire. Respondents believed that if they were to eat fruit for snacks or as a part of meals during their duty day it would: 'benefit their health,' 'give them energy,' 'taste good,' 'leave them hungry,' 'be expensive,' 'be messy,' 'make them feel better about themselves,' 'provide necessary vitamins,' and 'be time consuming.'

For control beliefs, on the other hand, there were significant differences found between the salient beliefs elicited at the general behavioral category level and the specific level. At the specific level of the behavioral target, six control belief categories were identified. Despite the fact these same six beliefs were mentioned in the elicitation at the general level, the frequency at which they were mentioned was not significant

enough to meet the criteria of making the modal belief set. So, elicitation at the specific level increased the saliency of some control beliefs.

The six control beliefs that surfaced at the specific level included 'it required little effort to eat,' 'it was more durable/less perishable,' 'there was a variety to choose from,' 'it was easy to clean up,' 'it was transportable,' and 'had an appropriate place to store.' Each of these categories, with the exception of 'variety to choose from,' has one common characteristic. They all refer to the logistical details or aspects of eating or maintaining fruit. Logically, these characteristics became more salient to the respondent when they were asked to consider what would make it easier/more difficult or more/less likely that they would choose one type of fruit over another.

Three control belief categories ('the fruit available was in good condition/looked good,' 'fruit was available/accessible,' and 'it was a specific type of fruit/fruit I liked') were represented in both modal salient sets while yet another two ('fruit I liked was convenient' and 'I was in the mood for the fruit available') were significantly less salient at the specific level. These two control beliefs would have been dropped from the modal salient set if elicitation was conducted only at the specific level. It is important to note that this was the case for behavioral beliefs also. Eliciting at the more specific level, information is both gained and lost. Thus, based on the results of this study, elicitation must be done at both levels to optimize the range of salient beliefs related to a general class of behaviors.

Although the behavioral and control beliefs obtained in the elicitation step are not weighted in terms of importance and quantified according to the final step in the TPB protocol, salient beliefs can be compared to beliefs elicited for similar behaviors or in similar populations. For example, Betts, et.al (1997) investigated how young adults (18-

24 years old) view their food choices in general. Using focus group research, they elicited similar beliefs in a student population. This group identified 'tasty,' 'nutrition,' 'adequate money,' 'looks good to eat,' 'convenience,' and 'perception of the satiety value of food' among other beliefs as factors salient in their food choice decisions. A similar study using focus group research was conducted to specifically identify factors affecting fruit and vegetable consumption in an adult population (Uetrecht, et.al., 1999). These researchers also found 'price,' 'time/convenience,' 'perishability,' 'health effects,' and 'taste and other sensory factors' were salient beliefs elicited in a discussion of the factors that influence the type of fruits and vegetables people choose to eat.

There were several differences in the behavioral and control beliefs elicited in this study and other similar studies. Behavioral beliefs identified as uniquely salient in this population included fruit as a 'source of energy' and as 'being messy to eat'. While control beliefs unique to the population in this study were 'availability of fruit and other competing foods,' 'preference for the fruit available,' 'portability,' and 'appropriate place to store.' Possible explanations of these differences are that these unique beliefs may have resulted from both the context of the elicitation questions and the unique features of the working environment of the target population. This study focused on the beliefs related to food consumption behavior at the worksite among a young, or entry-level, group in the workforce. This group finds attributes related to the energy value of the food and logistical aspects such as ease in eating, carrying, or storing fruit to be important factors in their decision to choose fruit. These aspects would make eating fruit either compatible or incompatible with their ability to perform their duties. Although the results may be similar in a population in a similar workforce, the uniqueness of these findings support the need to elicit salient beliefs in the population of interest.



## Final Questionnaire

### Final Questionnaire Design

The final step in this study was the design and testing of the final questionnaire. As was the case for the elicitation questionnaire design, the final questionnaire was designed according to the protocol and examples presented by Ajzen and Fishbein (1980) and similar questionnaires tested in previous studies of health related behaviors (Saunders, 1986; Schmelling, 1985; Godin, et. al., 1987; Pender & Pender, 1990). These examples provided clear guidance on the operationalization of the constructs of behavioral beliefs and normative beliefs with coinciding measures of evaluations of outcomes and motivation to comply. Modal salient beliefs identified in the elicitation step of this study were incorporated into the format established for these measures in previously designed and tested instruments.

The scale designed to measure the construct of behavioral beliefs and coinciding measure of perceived power, on the other hand, is one of the first to operationalize the construct of perceived behavioral control into control beliefs and perceived power. The researcher was interested in the specific control issues related to fruit consumption in this population rather than the general assessment of control. Given that the design of a scale to measure control at this level has not been established previously, it is essential to recognize the potential weaknesses inherent in the creation of a scale to measure a psychosocial construct. In future analysis of data obtained from this questionnaire, it will be essential to assess the reliability and validity of this scale before going forward with conclusions.

Another unique aspect of this study, and a strength in future study using this

questionnaire, is the inclusion of measures to assess patterns of eating behavior over time and the utility of fruit in the context of other food choices. Despite the ability and usefulness of the TPB to predict the motivational factors related to the decision to eat fruit, the theory fails to account for where this decision stands in relation to other food selection decisions. Unlike other studies of health behaviors using the TPB, by inclusion of the switching behavior scale and the constant sum scales, this study attempts to recognize the potential position the behavior of interest has in relation to competing behaviors.

#### Proposed Final Questionnaire Administration

The preliminary results of this investigation obtained in the elicitation process lend insight to the specific beliefs salient in this population for the decision to eat fruit. This raw data could be used in the development of broad interventions aimed at increasing fruit consumption among this population. But, though interventions would have some relevance and focus, they would still be speculative. In order to prioritize or justify targeting more specific interventions, such as making modifications in the environment to impact control beliefs, the relative importance of each construct in the theory with regard to the behavior of interest should be demonstrated. Administration and analysis of the final questionnaire would allow the researcher to weigh and quantify the relationship and relative importance between the constructs of attitude, norms and perceived control and the intention to perform the behavior within the given context.

To administer the questionnaire, the researcher would select a similar setting and similar population as was selected for the elicitation questionnaire. Subjects representative of the young Air Force enlisted force would be recruited to meet the minimum sample size of 120. The setting would be controlled to maintain the context of

the behavior (i.e. during the duty day/at the worksite) and to minimize response bias.

For analysis, behavioral intention would be established as the dependent variable, with scaled attitude toward behavior, subjective norm and perceived behavioral control items designated as the independent variables. Values for the independent variables would be obtained by multiplying individual responses for the belief by the corresponding evaluation. Then, for each belief category (behavioral, normative and control) the belief-evaluation pairs would be summed to create a belief-evaluation product.

Statistical analysis of the resulting data would be conducted to assess the reliability and validity of the scales and to evaluate the importance of each variable in explaining the intention. To examine construct validity, responses to scale items would be subjected to exploratory factor analysis. Then, internal consistency reliability of the scales would be assessed by calculating Cronbach's Coefficient Alpha. Finally, to determine the relative importance of each variable in explaining intention, intention would be regressed on the overall measure of attitude, subjective norm, and perceived behavioral control. Regression coefficients for each independent variable will reflect the relative contribution the respective variable makes to the explanation of the dependent variable, the intention to consume fruit.

### Study Implications

The findings in this study have several implications for future research. First, for researchers interested in using the TPB to explore health behavior or consumer behavior, the unique methods designed to elicit salient beliefs in this study may be advantageous to the study of other classes of behavior. Although the true benefit of taking the additional step to elicit beliefs at the specific behavioral level has not been tested by administration

and analysis of data from the final questionnaire, additional information relevant to the researcher has been gained. Yet, further analysis of data obtained using the final instrument and future research using this elicitation methodology are needed to determine the full implications of eliciting beliefs at varying levels of specificity on the effectiveness of the TPB to explain food choice decisions and other health behaviors.

In addition to the potential contribution of the unique elicitation methodology, this research resulted in a final instrument designed and pilot tested to measure factors related to fruit intake among active duty military men at the worksite. Again, future research must be done to validate the scale for use in this population and similar populations.

### Study Limitations

Although the objectives of this study were designed to overcome significant weaknesses associated with the use of the TPB, there are remaining limitations to the results obtained. First, as with any health behavior examined using the TPB, the modal salient beliefs related to fruit selection among the population of interest cannot be generalized to other food selection behaviors or other populations without further investigation. The beliefs identified in this study should be considered unique to the population from which they were elicited.

Second, the beliefs elicited in this study were obtained using qualitative methods and analysis was conducted subjectively. This study design poses significant limitations in the interpretation of the data. The results are not suitable for quantification and conclusions cannot be made based on statistical analysis of the response frequencies. Further interpretation of the identified salient beliefs requires administration and analysis of the final questionnaire in the target population.

## Appendix A: Questionnaire Development

1. Informed Consent Forms – Elicitation Questionnaire and Final Questionnaire
2. Open-ended Elicitation Questionnaires: Final Variation 1 & 2
3. Questionnaire and Result of Obtaining Clear and Specific Beliefs
4. Final Questionnaire: Final Version

## 1. Informed Consent Form – Elicitation Questionnaire

### **Information Statement:**

This research is conducted to look at what may influence the consumption of fruit at a military worksite among young enlisted males. This research consists of an elicitation questionnaire and a final questionnaire. You will participate in the elicitation phase.

You will receive an open-ended questionnaire and be asked to write down the answers or opinions that come to your mind for each question. There are no right or wrong answers. Based on your information, a final questionnaire will be compiled. It will take about 10 to 15 minutes to answer the questions.

You have the right to refuse to participate in this research and/or stop answering at any time without affecting your evaluation for this course. Your response to the questionnaire will be anonymous, and the results will be coded and analyzed among the group of respondents, not on an individual basis.

### **Risks:**

There are no physical, psychological, social or legal risks involved in this study.

### **Benefits:**

Participation in this study will give you an opportunity to think about beliefs or reasons regarding fruit consumption. The information that you provide is valuable in constructing a questionnaire for a final survey, and it will help develop programs which are designed to increase healthy food consumption at the military worksite among military members.

### **Consent:**

I have read the preceding information and have been informed of the procedure of this study. I have had the opportunity to ask questions and have received satisfactory answers to my concerns. I also understand that the risks associated with this study are almost none and that in case of injury resulting from participating in this study, any costs for care will be my responsibility. Finally, I agree to participate in this study.

If you have additional questions, please contact:  
Maureen Harback, Capt, USAF, BSC  
Department of Health Promotion and Education  
School of Public Health  
University of South Carolina  
777-6558

---

Signature

---

Date

## Informed Consent Form – Final Questionnaire

### **Information Statement:**

This research is conducted to look at the types of foods you choose and what may influence the consumption of specific types of food at a military worksite among young enlisted males. This research consists of an elicitation questionnaire and a final questionnaire. You will participate in the final questionnaire.

You will receive a questionnaire and be asked to respond to each question. It will take about 15 to 20 minutes to answer the questions.

You have the right to refuse to participate in this research and/or stop answering at any time without affecting your evaluation for this course. Your response to the questionnaire will be anonymous, and the results will be coded and analyzed among the group of respondents, not on an individual basis.

### **Risks:**

There are no physical, psychological, social or legal risks involved in this study.

### **Benefits:**

Participation in this study will give you an opportunity to think about beliefs or reasons regarding fruit consumption. The information that you provide is valuable in constructing a questionnaire for a final survey, and it will help develop programs which are designed to increase healthy food consumption at the military worksite among military members.

### **Consent:**

I have read the preceding information and have been informed of the procedure of this study. I have had the opportunity to ask questions and have received satisfactory answers to my concerns. I also understand that the risks associated with this study are almost none and that in case of injury resulting from participating in this study, any costs for care will be my responsibility. Finally, I agree to participate in this study.

If you have additional questions, please contact:  
Maureen Harback, Capt, USAF, BSC  
Department of Health Promotion and Education  
School of Public Health  
University of South Carolina  
777-6558

---

Signature

---

Date

## 2. Open-ended Elicitation Questionnaire: Final Variation 1

Imagine that you are at work and you want something to eat or you are taking a break for a meal or snack. Suppose you have decided you want to eat FRUIT.

What would make it easy or difficult for you to have FRUIT instead of other alternatives at meals or snacks during your typical workday? List as many things as you can think of.

Easy

Difficult

What are some of the advantages and disadvantages of eating FRUIT over other snacks or desserts during your typical day at work? List all of the advantages and disadvantages you can think of.

Advantages

Disadvantages



Suppose you were given a choice between the following fruits:

BANANA

ORANGE

SEEDLESS GRAPES

APPLE

What would make it easier to choose, to get or to eat an APPLE compared to the other fruits during your typical workday? List as many things as you can think of.

What would make it more difficult to choose, to get or to eat an APPLE compared to the other fruits during your workday? List as many things as you can think of.

List the reasons you might prefer the APPLE over the other fruits (banana, orange, seedless grapes) during your duty day.

List the reasons you might not prefer the APPLE over the other fruits (banana, orange, seedless grapes) during your duty day.

Often when we make decisions, we consider what other people would think OR whether other people would approve of our decision or choices.

List the people in you personal life or in your work environment that would influence your decision to eat fruit. If anyone has come to mind while you are filling out this questionnaire, list them here!

(Note: Name in terms of the role they play such as wife, child, supervisor, co-worker, friend, doctor, physical therapist, etc. rather than by proper name)

List the people in you personal life or in your work environment that would influence your decision to NOT eat fruit.

## 2. Open-ended Elicitation Questionnaire: Final Variation 2

Imagine that you are at work and you want something to eat or you are taking a break for a meal or snack. Suppose you have decided you want to eat FRUIT.

What would make it more likely you will eat FRUIT over other snacks or desserts during your typical day at work? List as many things as you can think of.

What would prevent you from eating FRUIT over other snacks or desserts during your typical day at work? List as many things as you can think of.

What good things may result from you eating FRUIT instead of other snacks or desserts during your typical day at work? List as many as you can think of .

What bad things may result from you eating FRUIT in place of other snacks or desserts during your typical day at work? List as many as you can think of.

Is there anything else you would get out of eating a piece of fruit over other choices during your typical day at work?

Suppose you were given a choice between the following fruits:

BANANA

ORANGE

SEEDLESS GRAPES

APPLE

What would make it more likely you will choose the APPLE over the other fruits during your typical workday? List as many things as you can think of.

What would make it less likely you will choose the APPLE over the other fruits during your typical workday? List as many things as you can think of.

Suppose you were able to choose the APPLE. List the advantages or disadvantages of eating the APPLE over the other fruits (banana, orange, seedless grapes) during your duty day.

Advantages

Disadvantages

Often when we make decisions, we consider what other people would think OR whether other people would approve of our decision or choices.

List the people in you personal life or in your work environment that would influence your decision to eat fruit. If anyone has come to mind while you are filling out this questionnaire, list them here!

(Note: Name in terms of the role they play such as wife, child, supervisor, co-worker, friend, doctor, physical therapist, etc. rather than by proper name)

List the people in you personal life or in your work environment that would influence your decision to NOT eat fruit.



### 3. Questionnaire and Result of Obtaining Specific and Clear Beliefs

Please indicate whether you think the following pairs of statements have the same meaning or a different meaning from each other by putting a check (✓) or an (X) on the appropriate line. There are no right or wrong answers. The important thing is your opinion.

I would be more/less likely to eat fruit for snacks or with meals during my duty day if:

fruit was available.		
fruit was convenient.	<u>      </u>	<u>      </u>
	SAME	DIFFERENT
the fruit available was in good condition (ripeness, freshness, etc.).	<u>      </u>	<u>      </u>
the fruit available looked good.	SAME	DIFFERENT
the fruit was easy to eat.		
the fruit required no preparation.	<u>      </u>	<u>      </u>
	SAME	DIFFERENT

If I were to eat fruit during my duty day as a snack or part of a meal...

I would be healthier.		
I would get more nutritional value.	<u>      </u>	<u>      </u>
	SAME	DIFFERENT
I would feel better about myself for eating healthy.	<u>      </u>	<u>      </u>
I would feel healthier/better.	SAME	DIFFERENT
I would be healthier.		
I would get sick less often.	<u>      </u>	<u>      </u>
	SAME	DIFFERENT
The fruit would give me energy.		
The fruit would not give me enough sugar to get me going.	<u>      </u>	<u>      </u>
	SAME	DIFFERENT
I would be healthier.		
the fruit would provide me necessary vitamins.	<u>      </u>	<u>      </u>
	SAME	DIFFERENT
I would get less calories.		
I would get less fat.	<u>      </u>	<u>      </u>
	SAME	DIFFERENT
It would help me lose weight.		
It would help me control my weight.	<u>      </u>	<u>      </u>
	SAME	DIFFERENT

I would get less calories.  
It would help me lose weight.

SAME

DIFFERENT

# Results of Rating from Target Population (n = 24)

I would be more/less likely to eat fruit for snacks or with meals during my duty day if:

fruit was available.		X
fruit was convenient.	<u>SAME</u>	<u>DIFFERENT</u>
the fruit available was in good condition (ripeness, freshness, etc.).	<u>X</u>	<u>DIFFERENT</u>
the fruit available looked good.	<u>SAME</u>	
the fruit was easy to eat.		X
the fruit required no preparation.	<u>SAME</u>	<u>DIFFERENT</u>

If I were to eat fruit during my duty day as a snack or part of a meal...

I would be healthier.		X
I would get more nutritional value.	<u>SAME</u>	<u>DIFFERENT</u>
I would feel better about myself for eating healthy.	<u>SAME</u>	<u>X</u>
I would feel healthier/better.		<u>DIFFERENT</u>
I would be healthier.		X
I would get sick less often.	<u>SAME</u>	<u>DIFFERENT</u>
The fruit would give me energy.	<u>X</u>	
The fruit would not give me enough sugar to get me going.	<u>SAME</u>	<u>DIFFERENT</u>
I would be healthier.		X
the fruit would provide me necessary vitamins.	<u>SAME</u>	<u>DIFFERENT</u>
I would get less calories.		X
I would get less fat.	<u>SAME</u>	<u>DIFFERENT</u>
It would help me lose weight.		X
It would help me control my weight.	<u>SAME</u>	<u>DIFFERENT</u>
I would get less calories.		X
It would help me lose weight.	<u>SAME</u>	<u>DIFFERENT</u>

#### 4. Final Questionnaire: Final Version

##### What foods do you eat with meals during your duty day?

Review the following list of foods. In the first column, indicate with a check mark (✓) each food you have eaten as a part of a meal during your past three duty days. Then, in the second column, indicate the foods you intend to eat as a part of a meal during the next three duty days. Indicate only the foods that were included and intend to be included at **meal times only, not eaten between meals**. Check **all** that apply. If none apply, leave the column blank.

	Foods you have eaten as part of a meal <b>over the past three days</b> you have worked...	Foods you intend to eat as a part of your meals <b>over the next three days</b> you will work...
Pastries (donut, muffin, honey bun)	<input type="checkbox"/>	<input type="checkbox"/>
Nuts/trail mix	<input type="checkbox"/>	<input type="checkbox"/>
Cookies	<input type="checkbox"/>	<input type="checkbox"/>
Cake/pie	<input type="checkbox"/>	<input type="checkbox"/>
Fruit	<input type="checkbox"/>	<input type="checkbox"/>
Frozen dessert (ice cream, frozen yogurt)	<input type="checkbox"/>	<input type="checkbox"/>
Candy	<input type="checkbox"/>	<input type="checkbox"/>
Cereal bar/granola bar	<input type="checkbox"/>	<input type="checkbox"/>
Chips (potato chips, corn chips, etc.)	<input type="checkbox"/>	<input type="checkbox"/>
Vegetables	<input type="checkbox"/>	<input type="checkbox"/>
Pretzels	<input type="checkbox"/>	<input type="checkbox"/>

In this section, we would like for you to divide 11 points, or "tokens" between each pair of foods listed below. You can divide the tokens any way you would like, depending on how much you generally prefer one food than the other **immediately following a meal** during the duty day.

Some possible combinations are 11 & 0, 1 & 10, 9 & 2, 3 & 8, 7 & 4, or 5 & 6. The two numbers you assign to the products in each pair must add up to 11. In each pair, always assign the larger of the two numbers to the food you would be more likely to choose. For this exercise, assume each food is available to you and that cost/price is not an issue.

Now, please rate each pair of foods going across the page. The number of tokens you decide to give a food should be recorded in the box next to it.

For example, I prefer cake or pie with my meals slightly more than fruit so I would assign my 11 tokens as follows:			
	TOKENS		TOKENS
FRUIT	<input type="text" value="5"/>	CAKE/PIE	<input type="text" value="6"/>

	TOKENS		TOKENS
FRUIT	<input type="text"/>	CAKE/PIE	<input type="text"/>
COOKIE	<input type="text"/>	FRUIT	<input type="text"/>
CAKE/PIE	<input type="text"/>	FROZEN DESSERT (ice cream or frozen yogurt)	<input type="text"/>
CAKE/PIE	<input type="text"/>	COOKIE	<input type="text"/>
FROZEN DESSERT (ice cream or frozen yogurt)	<input type="text"/>	FRUIT	<input type="text"/>
COOKIE	<input type="text"/>	FROZEN DESSERT (ice cream or frozen yogurt)	<input type="text"/>

CANDY	<input type="checkbox"/>	COOKIE	<input type="checkbox"/>
FRUIT	<input type="checkbox"/>	CANDY	<input type="checkbox"/>
FROZEN DESSERT	<input type="checkbox"/>	CANDY	<input type="checkbox"/>
CANDY	<input type="checkbox"/>	CAKE/PIE	<input type="checkbox"/>

### What foods do you eat between meals during your duty day?

Now, indicate with a check mark (✓) in the first column each food you have eaten between meals during your past three duty days. Then, indicate in the second column the foods you intend to eat between meals during the next three duty days. Indicate only the foods that were included and intend to be **eaten between meals**. Check **all** that apply. If none apply, leave the column blank.

	Foods you have eaten between meals <b>over the past three days</b> you have worked...	Foods you intend to eat between meals <b>over the next three days</b> you will work...
Pastries (donut, muffin, honey bun)	<input type="checkbox"/>	<input type="checkbox"/>
Nuts/trail mix	<input type="checkbox"/>	<input type="checkbox"/>
Cookies	<input type="checkbox"/>	<input type="checkbox"/>
Cake/pie	<input type="checkbox"/>	<input type="checkbox"/>
Fruit	<input type="checkbox"/>	<input type="checkbox"/>
Frozen dessert (ice cream, frozen yogurt)	<input type="checkbox"/>	<input type="checkbox"/>
Candy	<input type="checkbox"/>	<input type="checkbox"/>
Cereal bar/granola bar	<input type="checkbox"/>	<input type="checkbox"/>
Chips (potato chips, corn chips, etc.)	<input type="checkbox"/>	<input type="checkbox"/>
Vegetables	<input type="checkbox"/>	<input type="checkbox"/>
Pretzels	<input type="checkbox"/>	<input type="checkbox"/>

In this section, we would again like for you to divide 11 points, or "tokens" between each pair of foods listed below. This time, divide the tokens any way you would like depending on how much you generally prefer one food than the other **between meals** during the duty day.

Some possible combinations are 11 & 0, 1 & 10, 9 & 2, 3 & 8, 7 & 4, or 5 & 6. Remember, the two numbers you assign to the products in each pair must add up to 11. In each pair, always assign the larger of the two numbers to the food you would be more likely to choose. Again, for this exercise, assume each food is available to you and that cost/price is not an issue.

Now, please rate each pair of foods going across the page. The number of tokens you decide to give a food should be recorded in the box next to it.

For example, I prefer fruit between meals much more than candy so I would assign my 11 tokens as follows:

	TOKENS		TOKENS
FRUIT	<input type="text" value="9"/>	CANDY	<input type="text" value="2"/>

	TOKENS		TOKENS
FRUIT	<input type="text"/>	CANDY	<input type="text"/>
CEREAL BAR/GRANOLA BAR	<input type="text"/>	VEGETABLES	<input type="text"/>
VEGETABLES	<input type="text"/>	CHIPS (potato chips, corn chips, etc.)	<input type="text"/>
CEREAL BAR/GRANOLA BAR	<input type="text"/>	CANDY	<input type="text"/>
CHIPS (potato chips, corn chips, etc.)	<input type="text"/>	FRUIT	<input type="text"/>
CEREAL BAR/GRANOLA BAR	<input type="text"/>	CHIPS (potato chips, corn chips, etc.)	<input type="text"/>



CANDY	<input type="checkbox"/>	CHIPS (potato chips, corn chips, etc.)	<input type="checkbox"/>
FRUIT	<input type="checkbox"/>	VEGETABLES	<input type="checkbox"/>
VEGETABLES	<input type="checkbox"/>	CANDY	<input type="checkbox"/>
CEREAL BAR/GRANOLA BAR	<input type="checkbox"/>	FRUIT	<input type="checkbox"/>

### Do you intend to eat fruit during your duty day?

Please answer the following question concerning your food selection regarding fruit.

	<b>strongly agree</b>						<b>strongly disagree</b>	
I intend to eat fruit as a snack or as part of a meal during my duty day over the next three days.	1	2	3	4	5	6	7	

### What do you think about eating fruit?

The following section contains statements about what might happen if you were to eat fruit for snacks or as a part of your meals during your duty day. Beside each statement is a scale on which you can indicate how "likely" or "unlikely" you believe that statement to be by circling a number from 1 ("very likely") to 7 ("very unlikely"). The scale continuum is described in detail:

- 1 – very likely to occur
- 2 – most probably will occur
- 3 – probably will occur
- 4 – may or may not occur
- 5 – probably will not occur
- 6 – most probably will not occur
- 7 – very unlikely to occur

IF I WERE TO EAT FRUIT FOR SNACKS OR AS A PART OF MEALS DURING MY DUTY DAY OVER THE NEXT 3 DAYS IT WOULD:

	<b>very likely</b>						<b>very unlikely</b>	
Benefit my health.	1	2	3	4	5	6	7	
Give me energy.	1	2	3	4	5	6	7	
Taste good.	1	2	3	4	5	6	7	
Leave me hungry.	1	2	3	4	5	6	7	
Be expensive.	1	2	3	4	5	6	7	
Be messy.	1	2	3	4	5	6	7	
Make me feel better about myself.	1	2	3	4	5	6	7	
Provide necessary vitamins.	1	2	3	4	5	6	7	
Be time consuming.	1	2	3	4	5	6	7	

### How do you feel about the possible outcomes of eating fruit?

The following section contains statements about how you feel concerning the possible outcomes of eating fruit for snacks or as a part of meals during your duty day. Beside each statement is a scale on which you can indicate how "good" or "bad" you believe that outcome to be by circling a number from 1 ("very good") to 7 ("very bad"). The scale continuum is described below.

- 1 – very good
- 2 – good
- 3 – somewhat good
- 4 – neither good nor bad
- 5 – somewhat bad
- 6 – bad
- 7 – very bad

I FEEL THAT:

	very good						very bad
Being healthy is	1	2	3	4	5	6	7
Having energy is	1	2	3	4	5	6	7
Eating a food that tastes good is	1	2	3	4	5	6	7
Feeling hungry is	1	2	3	4	5	6	7
Eating a food that is expensive is	1	2	3	4	5	6	7
Eating a food that is messy is	1	2	3	4	5	6	7
Feeling better about myself is	1	2	3	4	5	6	7
Getting necessary vitamins is	1	2	3	4	5	6	7
Having a food that is time consuming to eat is	1	2	3	4	5	6	7

### What do other people think about you eating fruit?

The following statements concern what other people may think about you eating fruit for snacks or with meals during the duty day. Each statement will have a person who may be important to you; **if the person listed does not apply to you, leave that item blank.** Rate on the scale beside each individual how "likely" or "unlikely" that person would approve of your eating fruit during the workday. Circle 1 for "very likely" to 7 for "very unlikely" as indicated on the continuum below:

- 1 – very likely
- 2 – likely
- 3 – somewhat likely
- 4 – neither likely nor unlikely
- 5 – somewhat unlikely
- 6 – unlikely
- 7 – very unlikely

CIRCLE YOUR REPONSES TO THE FOLLOWING STATEMENTS:

	very likely							very unlikely
<u>Most people who are important to me</u> think I should eat fruit for snacks or as part of meals during my duty day in the next three days.	1	2	3	4	5	6	7	
<u>My wife/girlfriend/fiancée</u> thinks I should eat fruit for snacks or as part of meals during my duty day in the next three days.	1	2	3	4	5	6	7	
<u>My friends</u> think I should eat fruit for snacks or as part of meals during my duty day in the next three days.	1	2	3	4	5	6	7	
<u>My coworkers</u> think I should eat fruit for snacks or as part of meals during my duty day in the next three days.	1	2	3	4	5	6	7	
<u>My parents</u> think I should eat fruit for snacks or as part of meals during my duty day in the next three days.	1	2	3	4	5	6	7	
<u>My supervisor</u> thinks I should eat fruit for snacks or as part of meals during my duty day in the next three days.	1	2	3	4	5	6	7	
<u>My doctor/health care provider</u> thinks I should eat fruit for snacks or as part of meals during my duty day in the next three days.	1	2	3	4	5	6	7	

	<b>very likely</b>						<b>very unlikely</b>	
<u>My children</u> think I should eat fruit for snacks or as part of meals during my duty day in the next three days.	1	2	3	4	5	6	7	

How much do you want to please these people?

The following statements concern how much you want to do what the people listed below want you to do. Beside each person is a scale on which you can rate how much you would do what that person wants you to do. Circle 1 for "very much" to 7 for "not at all", as described on the continuum below.

- 1 – definitely want very much
- 2 – want very much
- 3 – want somewhat
- 4 – neither want nor don't want
- 5 – don't want
- 6 – don't want at all
- 7 – definitely don't want at all

WHEN IT COMES TO CHOOSING FOODS YOU WILL EAT, HOW MUCH DO YOU WANT TO DO SOMETHING TO PLEASE THESE PEOPLE?

	<b>very much</b>						<b>not at all</b>	
Most people who are important to me	1	2	3	4	5	6	7	
Wife/girlfriend/fiancée	1	2	3	4	5	6	7	
Friends	1	2	3	4	5	6	7	
Coworkers	1	2	3	4	5	6	7	
Parent	1	2	3	4	5	6	7	
Supervisor	1	2	3	4	5	6	7	
Doctor/health care provider	1	2	3	4	5	6	7	
Children	1	2	3	4	5	6	7	

**How likely are these conditions affecting your ability to choose fruit to occur?**

The following section contains statements about how likely each condition is to occur that may impact whether or not you eat fruit for snacks or as a part of your meals during your duty day. Beside each statement is a scale on which you can indicate how "likely" or "unlikely" you believe that statement to be by circling a number from 1 ("very likely") to 7 ("very unlikely"). The scale continuum is described in detail:

- 1 – very likely to occur
- 2 – most probably will occur
- 3 – probably will occur
- 4 – may or may not occur
- 5 – probably will not occur
- 6 – most probably will not occur
- 7 – very unlikely to occur

INDICATE HOW LIKELY EACH OF THE CONDITIONS ARE TO OCCUR:

	<b>very likely</b>						<b>very unlikely</b>	
<u>Fruit would be available to me</u> for snacks or meals during the duty day over the next three days.	1	2	3	4	5	6	7	
<u>Other foods/snacks besides fruit would be available to me</u> for snacks or meals during the duty day over the next three days.	1	2	3	4	5	6	7	
If fruit were available to me for snacks or meals during the duty day over the next three days, <u>it would be the kind I liked or was in the mood for.</u>	1	2	3	4	5	6	7	

IF I WANTED FRUIT FOR A SNACK OR PART OF A MEAL DURING THE DUTY DAY OVER THE NEXT THREE DAYS AND THE KIND I WANTED WAS AVAILABLE TO ME:

	<b>very likely</b>						<b>very unlikely</b>	
It would be convenient (i.e. in the snack bar or vending machine).	1	2	3	4	5	6	7	
It would be in good condition (i.e. correct ripeness, freshness, temperature, etc.)	1	2	3	4	5	6	7	
I would have the time to eat it.	1	2	3	4	5	6	7	

	very likely					very unlikely	
It would go bad easily/be perishable.	1	2	3	4	5	6	7
It would make a mess that would have to be cleaned up.	1	2	3	4	5	6	7
It would be transportable/I could carry it with me.	1	2	3	4	5	6	7
I would have an appropriate place to store it.	1	2	3	4	5	6	7

### How will these conditions affect your ability to eat fruit?

The following section contains statements about various conditions that may affect how easy or difficult it will be to eat fruit during your duty day. Beside each statement is a scale on which you can indicate how "easy" or "difficult" it will be to eat fruit for snacks or as a part of meals during your duty day given the designated condition. One (1) indicates "very easy" and 7 indicates "very difficult" with the complete scale continuum as follows:

- 1 – very easy
- 2 – easy
- 3 – somewhat easy
- 4 – neither easy nor difficult
- 5 – somewhat difficult
- 6 – difficult
- 7 – very difficult

INDICATE THE IMPACT EACH OF THE FOLLOWING CONDITIONS WOULD HAVE ON THE EASE OR DIFFICULTY OF EATING FRUIT FOR SNACKS OR AS A PART OF MEALS DURING YOUR DUTY DAY OVER THE NEXT THREE DAYS:

	very easy					very difficult	
Having <u>fruit</u> available to me for snacks or meals would make eating fruit	1	2	3	4	5	6	7
Having <u>other foods/snacks</u> available to me for snacks or meals would make eating fruit	1	2	3	4	5	6	7
Having <u>the kind of fruit I liked or was in the mood for</u> available to me as snacks or meals would make eating fruit	1	2	3	4	5	6	7

	very easy				very difficult		
Having the kind of fruit I like or am in the mood for <u>convenient to me (in the snack bar or vending machine)</u> would make eating fruit	1	2	3	4	5	6	7
Having the kind of fruit I like or am in the mood for <u>be in good condition (i.e. correct ripeness, freshness, temperature)</u> would make eating fruit	1	2	3	4	5	6	7
Having to make an effort to eat (i.e. <u>having to peel, segment, core, deal with seeds, or wash</u> ) the kind of fruit I like or am in the mood for would make eating fruit	1	2	3	4	5	6	7
If the kind of fruit I like or am in the mood for <u>would go bad easily or be perishable</u> it would make eating fruit	1	2	3	4	5	6	7
If the kind of fruit I like or am in the mood for <u>would make a mess that would have to be cleaned up</u> it would make eating fruit	1	2	3	4	5	6	7
If the kind of fruit I like or am in the mood for <u>was transportable or I could carry it with me</u> it would make eating fruit	1	2	3	4	5	6	7
If I had an appropriate place to store the kind of fruit I like or am in the mood for it would make eating fruit	1	2	3	4	5	6	7

Please respond to the following:

Age: \_\_\_\_\_

Rank (circle your current rank):      AMN      A1C      SRA      SSGT      TSGT

AFSC: \_\_\_\_\_

Duty Location (Squadron): \_\_\_\_\_

Are you married? \_\_\_\_\_ Do you currently live with your spouse? \_\_\_\_\_

How many dependents, other than your spouse, live with you? \_\_\_\_\_

**Thank you for participating !**



## REFERENCES

- AbuSabha, R., & Achterberg, C. (1997). Review of self-efficacy and locus of control for nutrition- and health-related behavior. Journal of the American Dietetic Association, 97(10), 1122-1132.
- Acheson, R. M., & Williams, D. R. (1983). Does consumption of fruits and vegetables protect against stroke? The Lancet, 1, 1191-1193.
- Ajzen, I. (1985). From intentions to actions: a theory of planned behavior. In J. Kuhl, & J. Beckman (Eds.), Action-control: From Cognition to Behavior (pp.11-39). Heidelberg: Springer.
- Ajzen, I. (1988). Attitudes, personality, and behavior. Chicago, IL: The Dorsey Press.
- Ajzen, I., & Fishbein, M. (1980). Understanding Attitudes and Predicting Social Behavior. Englewood Cliffs, NJ: Prentice Hall, Inc.
- Ajzen, I. & Madden, T. J. 1986. Prediction of goal-directed behavior: attitudes, intentions, and perceived behavioral control. Journal of Experimental Social Psychology, 22, 453-474.
- Axelson, M. L., Brinberg, D., & Durand, J. H. (1983). Eating at a fast food restaurant – a social-psychological analysis. Journal of Nutrition Education, 15(3), 94-98.
- Bandura, A. (1977). Self-efficacy: toward a unifying theory of behavior change. Psychological Review, 84, 191-215.
- Betts, N. M., Amos, R. J., Keim, K., Peters, P., & Stewart, B. (1997). Ways young adults view foods. Journal of Nutrition Education, 29, 73-79.
- Budd, R. J. & Spencer, C. P. (1984). Predicting undergraduates' intentions to drink. Journal of Studies on Alcohol, 45, 179-183.
- Caggiula, A. W., Christakis, G., Farrand, M. (1981). The multiple risk factor intervention trial (MRFIT). Preventive Medicine, 10, 443-475.
- Caggiula, A. W. & Watson, J. E. (1992). Characteristics associated with compliance to cholesterol lowering eating patterns. Patient Education and Counseling, 19, 33-41.
- Contento, I., Balch, G. I., Bronner, Y. L., Paige, D. M., Gross, S. M., Lytle, L. A., Maloney, S. K., Olson, C. M., Swadener, S. S., Bisignani, L., & White, S. L. (1995). The effectiveness of nutrition education and implications for nutrition education policy, programs, and research: a review of research. Journal of Nutrition Education, 27(6), 275-418.

Dillon, W. R., Madden, T. J., & Firtle, N. H. (1987). Marketing research in a Marketing Environment (3<sup>rd</sup> ed.). Burr Ridge, IL: Irwin.

Domel, S. B., et al. (1996). Psychosocial predictors of fruit and vegetable consumption among elementary school children. Health Education Research, 11(3), 299-308.

Ewald, B. N. & Roberts, C. S. (1985). Contraceptive behavior in college age males related to the Fishbein model. Advances in Nursing Science, 4, 63-69.

Fishbein, M., & Ajzen, I. (1975). Belief, attitude, intention and behavior. An introduction to theory and research. Reading, MA: Addison-Wesley Publishing Company, Inc.

French, S. A., Story, M., Hannan, P., Breitlow, K. K., Jeffrey, R. W., Baxter, J. S., & Snyder, M. P. (1999). Cognitive and demographic correlates of low-fat vending snack choices among adolescents and adults. Journal of the American Dietetic Association, 99(4), 471-475.

Gillman, M. W., Cupples, L. A., Gagnon, D., Posner, B. M. Ellison, R. C., Catelli, W. P., & Wolf, P. A. (1995). Protective effects of fruits and vegetables on development of stroke in men. Journal of the American Medical Association, 273, 1113-1117.

Gracey, D., et al. (1996). Nutritional knowledge, beliefs and behaviors in teenage school students. Health Education Research, 11(2), 187-204.

Godin, G., & Kok, G. (1996). The theory of planned behavior: a review of its applications to health-related behaviors. American Journal of Health Promotion, 11(2), 87-98.

Godin, G., Valois, P., Shephard, R. J., & Desharnais, R. (1987). Prediction of leisure time exercise behavior: path analysis. Journal of Behavioral Medicine, 10, 145-158.

Green, L. W., & Kreuter, M. W. (1991). Health promotion planning: An educational and environmental approach. Mountain View, CA: Mayfield Publishing Company.

Grogan, S. C., Bell, R., & Conner, M. (1997). Eating sweet snacks: gender differences in attitudes and behavior. Appetite, 28, 19-31.

Havas, S. et al. (1998). Factors associated with fruit and vegetable consumption among women participating in WIC. Journal of the American Dietetic Association, 98, 1141-1148.

Heimendinger, J. (1993). Community nutrition intervention strategies for cancer risk reduction. Cancer, 72, 1019-1023.

Heimendinger, J. & Van Duyn, M. S. (1995). Dietary behavior change: the challenge of recasting the role of fruit and vegetables in the American diet. American Journal of Clinical Nutrition, 61, 1394S-1401S.

House, J. S. (1981). Work stress and social support. Reading, Massachusetts: Addison-Welsey.

Humble, C. G. Malarcher, A. M., & Tyroler, H. A. (1993). Dietary fiber and coronary heart disease in middle-aged hypercholesterolemic men. American Journal of Preventive Medicine, 9, 197-202.

Israel, B. A. (1982). Social networks and health status: linking theory, research and practice. Patient Counselling and Health Education, 4, 65-79.

Jack, F. R., Piacentini, M. G., & Schroder, M. J. (1998). Perceptions and role of Fruit in the workday diets of Scottish lorry drivers. Appetite, 30, 139-149.

Janz, N. & Becker, M. (1984). The health belief model: a decade later. Health Education Quarterly, 11, 1-47.

Jenkins, C. D. (1979). An approach to the diagnosis and treatment of problems of health related behavior. International Journal of Health Education, 22(suppl. 2), 1-24.

Jeffrey, R. W., French, S. A., Raether, C., & Baxter, J. E. An environmental intervention to increase fruit and salad purchases in a cafeteria. Preventive Medicine, 23(6), 788-792.

Jeffrey, R. W., Pirie, P. L., Rosenthal, B. S., Gerver, W. M., & Murray, D. M. (1982). Nutrition education in supermarkets: an unsuccessful attempt to influence knowledge and product sales. Journal of Behavioral Medicine, 5, 189-200.

Johnson, M. L. & Vickery, C. E. (1990). Dietary practices, nutrition knowledge and attitudes of coronary heart disease patients. Health Values, 14(1), 3-8.

Keim, K. S., Stewart, B., & Voichick, J. (1997). Vegetable and fruit intake and perceptions of selected young adults. Journal of Nutrition Education, 29, 80-85.

Khaw, K. T., Barrett-Connor E. (1987). Dietary fiber and reduced ischemic heart disease mortality rates in men and women: a 12-year prospective study. American Journal of Epidemiology, 126, 1093-1102.

Kimiecik, J. (1992). Predicting vigorous physical activity of corporate employees: comparing the theories of reasoned action and planned behavior. Journal of Sport and Exercise Psychology, 14, 192-206.

Krebs-Smith, S. M., Heimendinger, J., Patterson, B. H., Subar, A. F., Kessler, R., & Pivonka, E. (1995) Psychosocial factors associated with fruit and vegetable consumption. American Journal of Health Promotion, 10(2), 98-104.

LaForge, R. G., Greene, G. W., & Prochaska, J. O. (1994). Psychosocial factors influencing low fruit and vegetable consumption. Journal of Behavioral Medicine. 17(4), 361-374.

Lappalainen. (1997). Difficulties in trying to eat healthier: descriptive analysis of perceived barriers for healthy eating. European Journal of Clinical Nutrition, 51(suppl. 2), 36-40.

Lindholm, B. W., Touliatos, J., & Wenberg, M. F. (1984). Predicting changes in nutrition knowledge and dietary quality in ten- to thirteen-year-olds following a nutrition education program. Adolescence, 19(74), 367-375.

Madden, T. J., Ellen, P. S., & Ajzen, I. (1992). A comparison of the theory of planned behavior and the theory of reasoned action. Personality and Social Psychology Bulletin, 18(1), 3-9.

McFarlane, T. & Pliner, P. (1997). Increasing willingness to taste novel foods: effects of nutrition and taste information. Appetite, 28, 227-238.

McGill, H. C. (1998). Nutrition in early life and cardiovascular disease. Current Opinion in Lipidology, 9(1), 23-27.

National Research Council. (1989). Diet and health: implications for reducing chronic disease risk. Washington, DC: National Academy Press.

Nguyen, M. N., Otis, J., & Potvin, L. (1996). Determinants of intention to adopt a low-fat diet in men 30 to 60 years old: implications for heart health promotion. American Journal of Health Promotion, 10(3), 201-207.

Oygard, L. & Rise, J. (1996). Predicting the intention to eat healthier foods among young adults. Health Education Research, 22(4), 453-461.

Pender, N. J. & Pender, A. R. (1986). Attitudes, subjective norms, and intentions to engage in health behaviors. Nursing Research, 35, 15-18.

Raitakari, O. T., Porkka K. V. K., Rasanen, L., & Viikari, J. S. A. (1994). Relations of life-style with lipids, blood pressure, and insulin in adolescents and young adults. The cardiovascular risk in young Finns study. Atherosclerosis, 111, 237-246.

Richardson, N. J., Shepherd, R., & Elliman, N. A. (1993). Current attitudes and future influences on meat consumption in the U.K. Appetite, 21, 41-51.

Rimm, E. B., Ascherio, A., Giovannucci, E., Spiegelman, D., Stampfer, M. J., & Willett, W. C. (1996). Vegetable, Fruit, and Cereal Fiber Intake and Risk of Coronary Heart Disease Among Men. Journal of the American Medical Association, 275(6), 447-451.

Saunders, R. P. (1986). Belief, value and normative changes related to continuation and noncontinuation in an exercise program. Unpublished doctoral dissertation, University of South Carolina.

Saunders, R. P. & Rahilly, S. A. (1990). Influences on intention to reduce dietary intake of fat and sugar. Journal of Nutrition Education, 22, 169-176.

Schifter, D. B., & Ajzen, I. (1985). Intention, perceived control, and weight loss: an application of the theory of planned behavior. Journal of Personality and Social Psychology, 49, 843-851.

Schmelling, E. C. (1985). Identifying the salient outcomes of exercise: application of marketing principles to preventive health behavior. Public Health Nursing, 2, 93-103.

Shannon, B., Bagby, R., Wang, M. Q., & Trenkner, L. (1990). Self efficacy: a contributor to the explanation of eating behavior. Health Education Research, 5(4), 295-407.

Shannon, B., Hendricks, M., Rollins, P., & Schwartz, R. M. (1987) A comprehensive evaluation of a worksite nutrition and weight-control program. Journal of Nutrition Education, 19, 109-116.

Shannon, B., Linton, B., Hsu, L. R., & Schwartz, R. M. (1986). Development of a nutrition and weight control program for Atlantic Richfield Company employees. Journal of Nutrition Education, 18, S47-50.

Sheppard, B. M., Hartwick, J., & Warshaw, P. R. 1988. The theory of reasoned action: a meta-analysis of past research with recommendations for modification and future research. Journal of Consumer Research, 15, 325-343.

Smith, A. M., Baghurst, K., & Owen, N. (1995). Socioeconomic status and personal characteristics as predictors of dietary change. Journal of Nutrition Education, 27, 173-181.

Sorensen, G., et al., (1999). Increasing fruit and vegetable consumption through worksites and families in the Treatwell 5 A Day study. American Journal of Public Health, 89, 54-60.

Steinmetz, K. A. & Potter J.D. (1996). Vegetables, fruit, and cancer prevention: A review. Journal of the American Dietetic Association, 96(10), 1027-1039.

Subar, A., Heimendinger, J., Patterson, B., Krebs-Smith, S., Pivonka, F. & Kessler, R. (1991). 5 A Day for Better Health; 1991 5 A Day baseline study of America's fruit and vegetable consumption. [On-line]. Available: <http://dccps.nci.nm.gov/5aday/dseline.html>

Tuorila, H., Pangborn, R. M. (1988). Prediction of reported consumption of selected fat-containing foods. Appetite, 11, 81-95.

Uetrecht, C. L., Greenberg, M., Dwyer, J. J., Sutherland, S., & Tobin, S. (1999). Factors influencing vegetable and fruit use: implications for promotion. American Journal of Health Behavior, 23, 172-181.

US Department of Health and Human Services, Public Health Service (1990). Healthy people 2000: national health promotion and disease prevention objectives. US Government Printing Office, DHHS publication 91 50212, Washington, DC.

US Department of Health and Human Services (1988). The Surgeon General's report on nutrition and health. US Government Printing Office, DHHS publication 88 50210, Washington, DC.

Verlangieri, A. J., Kapeghian, J. C., el-Dean, S., Bush, M. (1985). Fruit and vegetable consumption and cardiovascular mortality. Medical Hypotheses 16, 7-15.

Weizel, M. H. & Waller, P. R. (1990). Predictive factors for health-promotive behaviors in white, Hispanic, and black blue-collar workers. Family and Community Health, 13(1), 23-34.

Whitaker, R. C. (1994). Randomized intervention to increase children's selection of low-fat foods in school lunches. The Journal of Pediatrics, 125(4), 535-540.

Wittenbinker, J., Gibbs, B., & Kahle, L. (1983). Seat belt attitudes, habits, and behavior: an adaptive amendment to the Fishbein model. Journal of Applied Social Psychology, 13, 406-421.

Zimmerman, R. S., & Connor, C. (1989). Health promotion in context: the effects of significant others on health behavior change. Health Education Quarterly, 16(1), 57-75.